

Just for your
Tandy Color
Computer 1,2 and 3

June 1990

Canada \$4.95 U.S. \$3.95

The RAINBOW[®]

THE COLOR COMPUTER MONTHLY MAGAZINE

Shades of CoCo



**Hardware
Games
OS-9**



**Plus:
a look at
Those Darn
Marbles**



SUNDOG SYSTEMS

Sinistaar



Sundog Systems proudly presents the first 512K arcade game available for your CoCo III! If you don't have 512K, you will want to get it just for this game! The evil Sinistaars have invaded the galaxy and it falls to you to destroy them. These fiends will attempt to hold you with a constant barrage of drone ships while they muster their strength, and eventually find and obliterate you. Your mission is to mine the myriad asteroids in search of the precious ore which can be refined into slinbombs, your only weapon against the Sinistaars. Many surprises await as you advance through the increasingly difficult stages. Experience the fast-paced action of 512K packed with spectacular graphics, sound effects, and voices! Dozens of stages will keep you coming back for more. Req. 512K CoCo III and disk drive.

\$34.95

KYUM-GAI TO BE NINJA



Something is killing off the members of the legendary order of Kyum-Gai. In desperation, its leaders have called upon the powers of the life stone to resurrect you, their greatest hero; the NINJA GAI-DAN. Now, you must find and destroy the evil forces behind this dark plot. Use a multitude of martial arts moves to defeat your enemies, obtain treasure and weapons, and evade obstacles. *Kyum-Gai: to be Ninja* uses the most detailed 320x200 resolution, 16 color graphics, the highest quality digital sound effects, and spectacular animation to bring you the greatest martial arts game your CoCo III has ever seen. Created by the author of *Warrior King*, this incredible arcade game is a definite must for your CoCo III software collection. Join the ranks of the Kyum-Gai and find out what it means to be Ninja! Req. 128K CoCo III, disk drive, and joystick (2-button joystick supported).

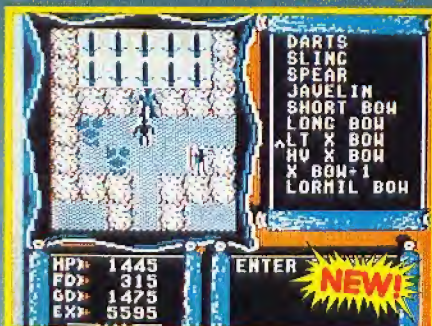
\$29.95



SoundTrax is an unprecedented sound sequencing system for the CoCo III. It requires no extra hardware (i.e. midi keyboards, cables, etc.). All of it is contained in your CoCo. This amazing program will read in a digitized sound and play back all of the notes in the octave in which it was recorded. And it's POLYPHONIC! You can sequence up to four voices at one time, and not only the same sound! With as many voices as can be held in your memory, depending on the song, you can create a score of up to THREE DAYS in length using drums, horns, strings, even your own voice! And you can play them all together! Using the built-in windowing point-and-click editor, you can cut, paste, even synchronize the score to just the way you like it. Use the pre-sampled sounds from the disk included, or make your own by importing them from some of the more popular digitizers available. Also, CALL for the availability of extra sound sample disks! Get it today; you won't believe your ears! Req. 128K CoCo III, mouse/joystick, and disk drive.

\$34.95

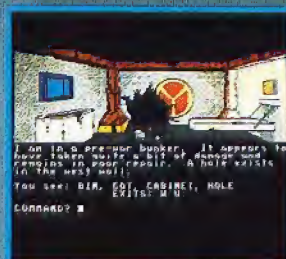
Paladin's Legacy



Years after the mysterious hero called the Paladin disappeared, loathsome creatures, spawned from the bowels of the planet, have overrun the land of Tarinth and captured the king. The situation is grave, for without the king's influence, the three nations will not unite against the growing evil. Only one pure of heart can master the five magics and thereby fulfill the Paladin's legacy and save the realm. Adventure into this vast land of fantasy, interact with its inhabitants, explore the ruinous mines, and do battle with supernatural forces. Experience the magic of the quest in this fast-paced role-playing adventure, all in the familiar quick scrolling, bird's eye play format. You will love the feeling of playing an action game with great graphics, animation, and sound effects, but all the while solving one of the most involved adventures yet. Tarinth awaits its savior! Available for all CoCo models! Req. 64K CoCo and disk drive.

\$24.95

ALSO AVAILABLE:



In Quest of the Star Lord
128K CoCo III, \$34.95
Hint Sheet: \$3.95



Warrior King
128K CoCo III, \$29.95



Kung-Fu Dude
64K CoCo, \$24.95

- Hall of the King I, II or III \$29.95 each
- Champion \$19.95
- Dragon Blade \$19.95
- White Fire of Eternity \$19.95
- Hall of the King Trilogy \$74.95

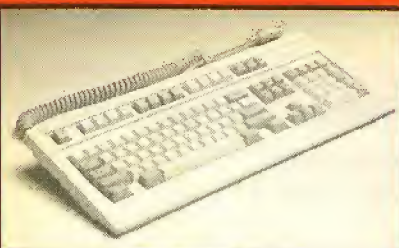
*All require 64K CoCo.



Visa, Mastercard, Check, Money Order, and COD (USA only, please) accepted. All foreign orders must be sent in US currency Money Orders. Include \$2.50 for shipping in USA and Canada. \$5.00 Foreign. \$3.00 extra for COD orders. PA residents add 6% sales tax. Dealer inquiries welcome. Authors: we're looking for new software!



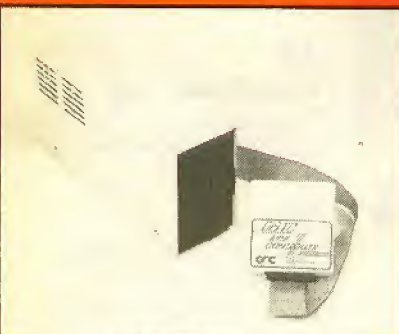
21 Edinburg Drive • Pittsburgh, PA 15235 • 412/372-5674



KEYBOARD

- 101 Keys with tactile touch
- Coiled cable with RF filter
- can be used with CoCo, Tandy or IBM and auto senses XT or AT

KB-1	Keyboard	\$98
KB-A	CoCo Adaptor	\$49
KB-1A	Keyboard & Adapt.	\$149



DRIVE 0 PLUS

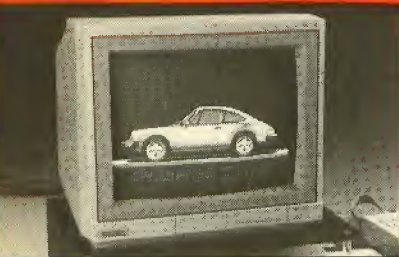
- Double sided 360K MPI 52
- Disto DC-7 controller and cable \$158.45
- **Double Drive 0+** \$268.45
- Drive 0 + Drive 1 (TEAC)



SLOT-PACK II by Chris Hawks

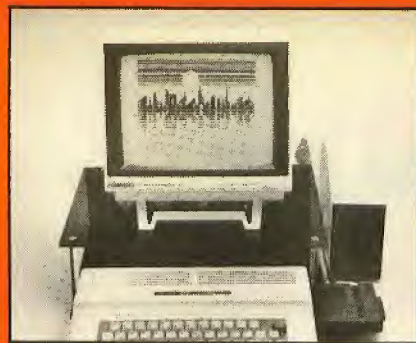
- replacement for multipack
- 3 slots, 2 switchable
- X slot for RS-232 and modem (specify)
- middle slot can take disk controller or ROM cartridge
- 12 Volt adaptor required so power is not drawn from CoCo

MP-II	slot pack II	\$89.45
AC-12	12 volt adaptor	\$14.95



MAGNAVOX 1CM135

- new analog with stereo sound and high grade composite screen
- 640 X 240 resolution @ 12 MHz with .42 dot pitch
- CC-3 RGB Cable \$19.95
- Shipping 6/16/90 **\$298** (\$14 ship)



MAGNAVOX 7622 AMBER

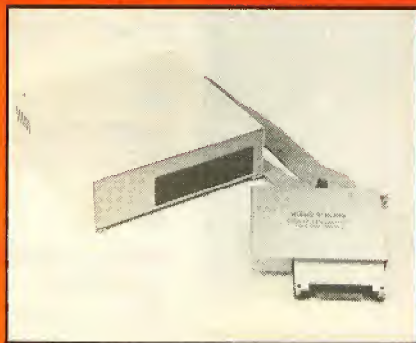
- 80 Column **OR 7652 GREEN**
- Built in Speaker **\$98** (7 ship)



MEMORY

- 512K Bare Board \$40
- Populated 512K & Software \$89
- 1 MEG Bare Board \$160*
- Populated 1 MEG \$200*

*requires 512K upgrade



HARD DRIVE

20,000,000 Bytes or the equivalent to 125 R.S. 501's on line are packed into this hard drive, pre installed and ready to run. This complete easy to use package includes a Seagate 20 Meg Hard Drive, a DTC 5150 Controller and interface, * a heavy duty case, power supply and fan and a 1 year warranty. This 20 Meg Hard Drive will also work with Tandy and IBM clones.

RSB Access Basic thru OS-9 \$39.45
FILE REPACK Un-Fragments disc \$29.45

See Rainbow Reviews 8/89

HD-1	10 Meg**	\$349
HD-2	20 Meg	\$499
HD-3	30 Meg	\$549
HD-4	40 Meg	\$598
HD-10	105 Meg	\$1,199

*Burke & Burke

**reconditioned

DISTO BOX

DC-7	Mini Controller	\$ 75.00
DC-3	Super Controller	\$ 98.00
DC-6	No Halt Controller	\$129.00
MBA-1	3 in 1 Board	\$ 69.45
MEB	Mini Expansion Bus	\$ 30.00
RS232	RS-232 Port	\$ 49.95
DC-3C	Clock and Parallel Port	\$ 40.00

PRINTERS

STARNX-1000R	COLOR	\$249.00
STARNX-1000II		\$189.00
VA-1	Video Converter for CoCo 1&2	\$29.45
HR-2	Dual Hi-res adapter	\$39.45

FLOPPY DRIVES

52	MPI 5 1/4 Full Height 40 track Double Sided 360K	\$39.45
92	MPI 5 1/4 Full Height 80 track Double Sided 720K	\$78.45
55B	TEAC 5 1/4 Half Height 40 track Double Sided 360K	\$98
53B	TEAC 5 1/4 Half Height 80 track Double Sided 720K	\$108
235	TEAC 3 1/2 Half Height 80 track Double Sided 720K	\$89
FR-35	Frame Fits 3 1/2 into 5 1/4 space	\$12
502-C	Power Cable for 502	\$12

30 Day Money Back Guarantee

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatability. If you're not happy with it for any reason, return it in 30 days and we'll give your money back (less shipping.) Shipping charges are for 48 states. APO, Canada and Puerto Rico orders are higher.



Howard Medical Computers

1690 N. Elston

Chicago, Illinois 60622

Order Status and Inquiries
312-278-1440

Master Card • Visa • Discover
American Express
C.O.D. • School P.O.'s

Order Line
800-443-1444

RAINBOW

Table of Contents

June 1990
Vol. IX No. 11

Features

12

Vegas at Your Fingertips

John Mosley
A slot machine for the CoCo 3

26

Back From the Dead

Bill Daniels
Resurrecting killed files

36

Type Does Windows

Chris Swinefurth
A utility to switch window types

50

CoCo Jumble

Shane Messer
A scrambled word game for CoCos 1, 2 and 3

58

Breaking the 32K Barrier

Greg Zumwalt
A look at the latest ROM Paks



66

84

Assembly Line, Part 2

William P. Nee
Get the picture

Novices Niche

48

Letters & Numbers

Robert I. Mills

48

Superpoke

Geoff Friesen

49

Solving Quadratic Equations

William Flinn

54

BASIC Training

Joseph Kolar
The A-option wrap-up

44

BreakPoint

Greg Law
Scaling the directory tree

39

CoCo Consultations

Marty Goodman, M.D.
Just what the doctor ordered

92

Database Report

Eddie Kuns
OS-9 uploads growing

18

Education Notes

Steve Blyn
The whole idea of putting integers in order

10

Print#-2

Lonnie Falk
Editor's notes

8

Turn of the Screw

Tony DiStefano
Clearing the paths

22

Wishing Well

Fred B. Scerbo
Learning lettersequences with In-Between

Product Reviews

Div and ConDiv/XYORN	68
Omni Utility 2.0/GSW Software	68
Paladin's Legacy/Sundog Systems	74
Predator/Activision	76
S — Screen Control Utility/r3 Systems	72
Those Darn Marbles/Oblique Triad	66
UpDOS/ESP	72
A World at War/GSW Software	75

Departments

Advertisers Index	96
Back Issue Info	40
CoCo Gallery	20
Corrections	48
The Intercom	90
Letters to Rainbow	5
Received & Certified	78

THE RAINBOW is published every month of the year by FALSOFT, Inc., The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059, phone (502) 228-4492. THE RAINBOW, RAINBOWfest and THE RAINBOW and RAINBOWfest logotypes are registered trademarks of FALSOFT, Inc. • Second class postage paid Prospect, KY and additional offices: USPS N. 705-050 (ISSN No. 0748-4797). POSTMASTER: Send address changes to THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Authorized as second class postage paid from Hamilton, Ontario by Canada Post, Ottawa, Ontario, Canada. • Entire contents copyright © by FALSOFT, Inc., 1990. THE RAINBOW is intended for the private use and pleasure of its subscribers and purchasers and reproduction by any means is prohibited. Use of information herein is for the single end use of purchasers and any other use is expressly prohibited. All programs herein are distributed in an "as is" basis, without warranty of any kind whatsoever. • Tandy, Color BASIC, Extended Color BASIC and Program Pak are registered trademarks of the Tandy Corp. • Subscriptions to THE RAINBOW are \$31 per year in the United States; Canadian rates are U.S. \$38; Surface mail to other countries is U.S. \$68, air mail U.S. \$103. All subscriptions begin with next available issue. • Limited back issues are available. Please see notice for issues that are in print and their costs. Payment accepted by VISA, MasterCard, American Express, cash, check or money order in U.S. currency only. Full refund after mailing of one issue. A refund of 10/12ths the subscription amount after two issues are mailed. No refund after mailing of three or more magazines.

"BASICally Speaking" and "Wrap-
ping The Rainbow" will return next
month.

Letters to the RAINBOW

Addition to Disk Copy Utility

Editor:

If you add the following lines to Mr. Medlock's "Disk Copy Utility" on Page 31 of the January 1990 issue, the program overwrites files on request. This only works on the CoCo 3, which has built-in error-trapping capability. The ONERR command is placed at the beginning to trap all errors. Other errors that can be trapped in this program are Error 28, Disk Full or Error 30, Write-Protected. Error code numbers are listed in the CoCo 3 Extended BASIC and Disk System manuals.

```
20 'CATCH ANY ERROR
25 CLS:ONERR GOTO 320
320 'CATCH FILE ALREADY EXISTS E
RROR
330 IF ERNO=33 THEN PRINT"FILE A
LREADY EISTS"
340 PRINT"REWRITE? (Y/N)?"
350 'CHECK FOR ANSWER
360 N$=INKEY$:IF N$=""THEN360
370 IF N$="N" OR N$="n" THEN GOT
O 310 ELSE IF N$="Y" OR N$="y"
THEN PRINT"DELETING",NAME$+"":1"
380 'IF YES, DELETE THE FILE ON
DRIVE ONE
390 KILL NAME$+"":1":ENTRY=ENTRY:
GOTO180
```

John A. Coldwell
Prince Rupert, British Columbia
Canada

CoCo Forecast

Editor:

I found your March 1990 editorial interesting and exciting, especially when read in context of the announcement made on Page 25 by Kenneth Leigh Enterprises. I am sure most of us are eagerly anticipating what is about to happen.

One of the fascinating observations I've made regarding the CoCo is the community itself. The community has decided to forge ahead. Many CoCo users have in mind to build a successor to the CoCo 3 that we'll support ourselves. That spirit has been alive and well ever since the release of OS-9 Level 2.

Some changes are in store for us. It seems pretty certain that in order to expand our software and experience base, we need to embrace OSK. For those of us willing to

accept change and true progress, this should prove to be no obstacle.

It looks like we are going to get our chance to see what some computer enthusiasts can do. I don't know of any group that has developed their own machine, and I have no idea what the future holds for us, but I don't believe it's going to be boring.

Wayne Montague
Mississauga, Ontario
Canada

O or 0?

Editor:

Two problems occur with your new listings. A magnifying glass is required to read them and it is impossible to differentiate between the 0 and O. In the one-liners of January 1990, I could not run many of them because it was impossible to tell whether they were O or 0. Those familiar with programming can differentiate between some of them but not all without long testing. It's a real inconvenience. Why don't you replace the letter O with a sign such as a diamond; then anyone could tell which is which?

I'd also like to bring up another point. More and more the magazine allocates space to OS-9 and machine language, leaving the majority of readers with what is left, which is becoming less and less. Of course OS-9 and machine language are the future, but they unfortunately are impossible to comprehend even with the articles.

What is lacking in the magazine is a series of articles on advanced programming in BASIC. Most readers are familiar with the Color BASIC manual; however, it does not contain anything on advanced programming in BASIC.

THE RAINBOW was running an interesting article called "Do-It-Yourself Database," by Richard Perlman, but it has never been completed. Other writers present interesting programs but these are limited. Never do we find a structured series on advanced programming for those interested in more than the amateur projects.

Armand Belanger
Laval des Rapides, Quebec
Canada

The zeroes in RAINBOW listings are slashed to help you differentiate them from the letter O. Because of the way the One-Liners feature in the January issue was

The Rainbow

Editor and Publisher
Lawrence C. Falk

Managing Editor Cray Augsburg
Associate Editor Sue Fomby
Copy Editor Kelly Goff
Copy Assistant Theresa Johnson
Submissions/Reviews Editor
Tony Olive

Technical Editor Greg Law
Technical Assistants Ed Ellers,
Gregory Shultz
Editorial Assistant Julie Hutchinson,
Wendy Falk Barsky

Contributing Editors
William Barden, Jr.
Steve Blyn, Tony DiStefano
Martin Goodman, M.D.
Dale Puckett, Fred Scerbo

Art Director Heidi Nelson
Designers Sharon Adams,
O'Neil Arnold, Teri Kays
Consulting Editors Judi Hutchinson,
Lauren Willoughby
Typesetter Debbie Diamond

Falsoft, Inc.

President Lawrence C. Falk
General Manager Bonnie Frowenfield
Asst. General Mgr. for Finance
Donna Shuck
Admin. Asst. to the Publisher
Kim Thompson
Editorial Director John Crawley
Senior Editor Jutta Kapfhammer
Director of Production Jim Cleveland
Chief Bookkeeper Diane Moore
Dealer Accounts Judy Quashnock
Asst. Gen. Manager For
Administration Sandy Apple
Corporate Business Technical Director
Calvin Shields
Word Processor Manager
Patricia Eaton
Customer Service Manager
Beverly Bearden
Customer Service Representative
Carolyn Fenwick
Chief of Printing Services Melba Smith
Dispatch Tim Whelan
Business Assistant Laurie Falk
Chief of Building Security and
Maintenance Lawrence Johnson
Development and Advertising
Manager Ira Barsky
Advertising Representatives
Belinda Kirby, Kim Vincent
Advertising Assistant Debbie Baxter
(502)228-4492

For RAINBOW Advertising and
Marketing Office Information,
see Page 96

Cover illustration by Heidi Nelson

created, we were not able to do this.

Part 4 of "Do-It-Yourself Database" appears in the May 1990 issue and the last installment is scheduled to appear in July.

Serial Joysticks?

Editor:

I have a CoCo 2 and am wondering if it is possible to use joysticks by plugging them into the serial and cassette ports using special adapters and commands.

James Donegan
14 Hemlock Lane
Saugerties, NY 12477-2110

The joysticks must be plugged into the two joystick ports. They will not work in the serial and/or cassette ports without extensive hardware and software modifications.

Come Out of the Closet, CoCo

Editor:

I'm looking to buy a Tandy Color Computer 2 (16, 32 or 64K) with or without Extended BASIC. If you've got one in your closet (preferably unmodified and working), call me at (301) 490-1996. I'm also interested in locating lower-kit boards that give the old CoCo 2 true lowercase letters.

Alfredo Santos
1216 Shadetree Lane
Laurel, MD 20708

Rainbow Database

Editor:

After years of collecting RAINBOW and RAINBOW ON TAPE/DISK, I have so many programs I can't keep track of them. It would be wonderful if someone could set up a database of RAINBOW programs to date. Could this be one of your anniversary surprises?

Steve Ostrom
Minnetonka, Minnesota

Well, we do publish a yearly index of articles. But a complete databased index to RAINBOW ON TAPE/DISK? Now that's an idea we'll look into.

Sagging Support

Editor:

I have been a subscriber to your magazine for several years. I'd like to express my concern over the lack of support displayed by some of your contributors. It seems that even though the authors solicit comments on their work and imply a willingness to engage in correspondence with those who write (SASE enclosed), some of them have been extremely negligent by ignoring my pleas for help.

On four separate occasions I have written letters to contributors at the addresses

given, enclosed the SASE, explained my needs and then trusted that they would afford me the courtesy of a rapid reply. I'm afraid that hasn't happened.

James R. Vann
Elmwood, Connecticut

We are sorry to hear you got no response. We do all we can to encourage our contributors to respond. And your sending an SASE can help. But sometimes even that is not enough.

Morse Detector

Editor:

In the May '89 RAINBOW reader Dwayne Fitzgerald (a ham radio operator) asked if there is any way to use a CoCo 1, 2 or 3 to decode Morse code. I read this in your "BASICally Speaking" column.

I am aware of one such interface made specifically for the CoCo 1, 2 and 3. This unit is made and sold by Dynamic Electronics, P.O. Box 896, Hartselle, AL 35640.

This unit uses an interface cable that hooks to the cassette port and one joystick port. It sells for \$39.95 complete, or \$19.95 program only, and you build your own interface.

Tom Harvey
New Hampton, Iowa

Natural Respect

Editor:

I was appalled when I read through the April 1990 issue of THE RAINBOW and came across the program *Steady Aim Fire* by Kathy Rumpel. The program has the user shoot at birds on a telephone wire with a BB gun.

As a biology teacher, one of the goals I have is for all my students to develop a respect for living things. I feel the inclusion of this program in your magazine was in very poor taste. I certainly don't want my students using a program that encourages this type of activity and have deleted this program from the disk. I hope that in the future THE RAINBOW will think twice before publishing a program of this nature.

Bob Teague
Winthrop High School
Winthrop, Maine

Cousin CoCo

Editor:

Because of the atmosphere created by THE RAINBOW, the CoCo has become more a part of the family than just an appliance.

There are some great programs for the CoCo that are powerful, friendly and affordable. This makes the CoCo a hobby rather than a dollar sink.

What I'm looking for in your magazine

is an update of WEFAX to make it receive phone line FAX messages; a review of the Hewlett Packard DeskJet Plus printer; and a MAX-10 type emulator for a spreadsheet and database.

Bill Palmer
Port Elgin, Ontario
Canada

Need a Try-o-Tax Tip

Editor:

Is there a computer program that will let me store tax records on disk?

I have the 1986 version of *Try-o-Tax*, but it needs a yearly upgrade to work. It can't be saved to disk, which is what I'm looking for so I can have more orderly record keeping of tax records. I've seen a program from Puritas Springs Software that saves it to disk, but I still need a yearly upgrade in order for it to work. Is there such a program available?

I have *DeskMate 3* for the Color Computer 3. I really don't want to put anymore money into the CoCo 3. If I can't do this using the CoCo 3, I'll have to move up to the Tandy 1000 HX, SL or TL.

Theodore Schultz, Jr.
963 Lincoln Drive East
West Bend, WI 53095

Yearly updates are required for tax programs because of the yearly changes in tax laws. Of course, you may devise a means of storing your tax info using the DeskMate 3 spreadsheet.

To the Rescue!

Editor:

Many thanks to Howard Medical for sending me the disk drive power connector I had dropped at its booth at the recent RAINBOWfest in Chicago. A few days after the show, I was installing the drive I had purchased from them when I realized the connector was missing. I searched all over (I even cleaned out the car in the process) but I couldn't find the connector. Two days later, I received the connector in the mail along with a note from Howard Medical. It's the little things like this that make buying CoCo stuff a real pleasure.

James Hawerbier
Elmhurst, Illinois

A Just Response

Editor:

Recently, the *Tetris* ROM pak I bought in March '89 developed a problem and would no longer function. I took it to the local Radio Shack Computer Center for assistance. They were not able to help me, so I bought another one.

Determined that it was not my fault, I decided to write to Radio Shack in Fort

CIII Pages



by Walter Bayer

The **ultimate desktop publishing** program for the CoCo 3. Pull-down menus, icons & dialog boxes, drawing tools (create boxes, polygons, rays, circles, ellipses, brush shapes), cut, copy, stamp, paste, zoom, flip, enlarge/reduce, rotate, stretch, undo, import any ASCII text, 2/3 columns & page preview. Includes 14 fonts & 60 pieces of clip art. Req. CoCo 3, RGB/ Monochrome Monitor, Min 1 drive, Tandy Hi-Res Interface, Joystick/mouse & DMP 105/106/Epson/Gemini & Compatible Printer. Only **\$49.95**. w / Hires Interface Only **\$59.95**.

CoCo Graphics Designer Plus

Create beautiful greeting cards, signs and banners for holidays, birthdays and other occasions. Features easy-to-use point and click interface and user-friendly operation. Picture, font and Border collections included. Only **\$29.95** (Req CoCo 2/3, disk drive, mouse or joystick, Printers: EPSON, GEMINI, Star, DMP, Panasonic KXP 1080/90/91/92, Cito 8510, Okidata 92/93/182/183 & more)

Picture Disk #2, #3, #4: \$14.95 each

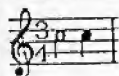
Font Disk A,B: \$14.95 each Border Disk #1: \$14.95

Label Designer

Print Labels with text and graphics; mail merge option; disk directory option; easy to use interface. Only **\$34.95**

Color Schematic Designer Ver 2.0

The **best Circuit Designer** for the CoCo 3. Pull Down Menus, hi-resolution symbol sets, Keyboard / Mouse / Joystick (with proportional cursor speed system), lightning fast multiple UNDOs, Symbol Add / Modify / Rotate/Line/Box Draw, Hi-res Fonts, workspace of 640 x 1000 pixels, 3 layers, font styles (fancy, italic, block, computer, etc). Supports DMP/ EPSON / GEMINI & compatible printers. Supports **near laser quality printouts** on almost all EPSON Compatibles! Only **\$39.95**. CSD 1.1 / 1.2 owners can upgrade to version 2.0 by sending \$10 with proof of purchase. (See Review in September 1989 Rainbow)



MUSIC



Musica II: Best Music Composition program for the CoCo 1,2 & 3. Disk Only **\$29.95**

Lyra: MIDI Based Music Composition program for CoCo 1,2 & 3. Disk Only **\$49.95**

The Lyra Companion (Book): \$9.95

CoCo Midi 3 Hardware: Sophisticated MIDI sequencer / recorder. Only **\$99.95**

CoCo Midi 3 Software: \$59.95

Max 10: \$39.95

Spelling Checker for Max 10: \$29.95

Max 10 Fonts (36 fonts): \$29.95

CoCo Max III: \$49.95

CoCo Max III Fonts (95 fonts): \$49.95

Max Edit (Font Editor): \$19.95

NX1000 Rainbow Driver: \$19.95

CGP 220 Driver: \$19.95

CoCo Max II: \$69.95

CoCo Max I (Tape): \$59.95

MAXPATCH: Run Max 2 on 3. \$19.95

VIP CALC III

Best Spreadsheet for CoCo 3. **\$69.95**

VIP DATABASE III

Best Database for the CoCo 3. **\$69.95**

DISTO 1 MEG UPGRADE KIT

- Upgrade your CoCo 3 to 1 MEG!
- Kit Includes 512K Memory and necessary Hardware
- Includes OS9 Drivers by Kevin Darling
- Requires 512K CoCo 3 and soldering experience.

Zero K Kit: \$159

1 MEG Kit: \$199

CoCo Util II

Transfer Basic Programs & ASCII Files between CoCo & IBM. Req DOS 3.2 or lower. Req. IBM Compatible w/ 2 drives. Only **\$39.95**

Xenocopy

Allows you to format/ duplicate / read/write disks between 300 different computers; for ex. between CoCo, IBM, NEC, etc. Requires IBM Compatible w/ 2 drives. Only **\$79.95**

CEBBS (By Kevin Berner)

Features Xmodem Up/Downloading, menus, login, message base, clock/ calendar, execution of external programs, fullSysop control & remote system access. Even HYPERIO Compatible. Only **\$49.95**. Min Req. CoCo 3, 1 Drive, & RS232 Pack.

DOS

EXTENDED ADOS 3: Here it is! Highly acclaimed DOS from Spectrosystems with built-in Ramdisk & Point-and-pick & much much more. **\$39.95**

Driver for Disto RTC: \$5 28-pin Adapter: \$10

Smartwatch RTC: \$34.95 Drivers: \$10

ADOS 3: \$39.95 ADOS: \$27.95

Eprom Burning Service: \$12+ Eprom

RGB DOS: Supports double sided drives, up to 2 hard drives & more. Epromable. **\$29.95**

OS9 Hard Disk Drivers Plus Hard Disk Boot: Only \$19.95

PRINTERS



NX1000 Multifont II: \$199

Panasonic KXP1180: \$209

NX1000 Rainbow 9 Pin: \$249

NX2400 24-pin Printer: \$349

Panasonic KXP1124 Printer: \$369

(Please Include \$8 S&H for Printers)

Serial to Parallel Interface: \$44.95



MICROCOM SOFTWARE

2900 Monroe Ave, Rochester, NY 14618
To Order: Refer to Page 17 of our 6-page series (Pg. 7-17).

Credit Card Toll Free Orderline: 1-800-654-5244
(9AM-8PM 7 Days/week)

Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. Fax: 716-383-0026.



Worth. I didn't expect a response and the one I got was very gratifying. Tandy agreed that I should just be charged a replacement fee instead of the full price and so refunded the difference to me.

*Paul Yelk
Montgomery, Alabama*

A Toot of the Horn

Editor:

We have recently had a very pleasant experience with one of RAINBOW's advertisers, Rulafor Research of San Diego, California, and would like to share it with other readers.

Late last fall we wrote Mr. Cecil Houk of Rulafor Research, inquiring about some problems we were experiencing with an early version of *Lyra*. We purchased the program from Speech Systems, a now-defunct company, well before Rulafor Research even began distributing it. Not only did Cecil respond, but he did so via a phone call. He provided us with much valuable advice, and assisted us in locating an affordable MIDI-capable synthesizer. We are now enjoying a vastly-improved version of *Lyra* and enjoying it much more, thanks to Cecil.

*Chuck and Greg Baker
Salem, Oregon*

Serial Drivers

Editor:

I am looking for the source code for the equivalent of the COM #X command to use for interfacing lab equipment with our Color Computer via an RS-232 Pak. Can anyone provide me with this information?

*Christopher E. Elhardt
Department of Chemistry
Baylor University
Box 7348
Waco, TX 76798-7348*

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

The RAINBOW Bookshelf

The Complete Rainbow Guide to OS-9

Authors Dale Puckett and Peter Dibble demonstrate OS-9's multitasking and multiuser features.

The Complete Rainbow Guide to OS-9 Level II Vol.I: A Beginners Guide to Windows

Puckett and Dibble uncover the mysteries of the new windowing environment.

The Rainbow Introductory Guide to Statistics

Dr. Michael Plog and Dr. Norman Stenzel give a solid introduction to the realm of statistical processes.

The First Rainbow Book of Adventures

Contains 14 winning programs from our first Adventure contest.

The Second Rainbow Book of Adventures

Featuring 24 of the most challenging Adventure games ever compiled.

The Third Rainbow Book of Adventures

The Excitement continues with 19 new Adventures.

The Fourth Rainbow Book of Adventures

Fourteen fascinating new Adventures from the winners of our fourth Adventure competition.

The Rainbow Book of Simulations

20 award-winning entries from THE RAINBOW's first Simulations contest.

The Second Rainbow Book of Simulations

The 16 Winners from our second Simulations contest.

Name _____
Address _____
City _____
State _____ Zip _____
☐ Payment Enclosed, or ☐ Charge to:
☐ VISA ☐ MasterCard ☐ American Express
Account Number _____
Card Expiration Date _____
Signature _____

<input type="checkbox"/> The Rainbow Book of Simulations (first)	\$ 9.95	\$ 3.50	_____
<input type="checkbox"/> Rainbow Simulations Tape (first)	\$ 9.95	\$ 3.50	_____
<input type="checkbox"/> First Simulations Package	\$10.90	\$ 6.00	_____
<input type="checkbox"/> The Second Rainbow Book of Simulations	\$ 9.95	\$ 4.95	_____
<input type="checkbox"/> Second Rainbow Simulations Tape	\$ 9.95	\$ 4.95	_____
<input type="checkbox"/> Second Rainbow Simulations Disk	\$10.95	\$ 4.95	_____
<input type="checkbox"/> Second Simulations Package with Tape	\$10.90	\$ 8.95	_____
<input type="checkbox"/> Second Simulations Package with Disk	\$20.90	\$ 8.95	_____
<input type="checkbox"/> The Complete Rainbow Guide to OS-9	\$10.95	\$12.95	_____
<input type="checkbox"/> Rainbow Guide to OS-9 Disk Set (2 disks)	\$31.00	\$19.95	_____
<input type="checkbox"/> Rainbow Guide to OS-9 Package	\$47.95	\$29.95	_____
<input type="checkbox"/> The Windows & Applications Disk for The Complete Rainbow Guide to OS-9 Level II, Vol. I		\$19.95	_____
<input type="checkbox"/> The Rainbow Book of Adventures (first)	\$ 7.95	\$ 2.00	_____
<input type="checkbox"/> Rainbow Adventures Tape (first)	\$ 7.95	\$ 2.00	_____
<input type="checkbox"/> First Adventure Package	\$15.90	\$ 3.50	_____
<input type="checkbox"/> The Second Rainbow Book of Adventures	\$12.95	\$ 6.95	_____
<input type="checkbox"/> Second Rainbow Adventures Tape	\$13.95	\$ 6.95	_____
<input type="checkbox"/> Second Adventure Package	\$27.90	\$11.95	_____
<input type="checkbox"/> The Third Rainbow Book of Adventures	\$14.95	\$ 6.95	_____
<input type="checkbox"/> Third Adventures Tape	\$ 9.95	\$ 6.95	_____
<input type="checkbox"/> Third Adventures Disk Set (2 disks)	\$14.95	\$ 7.95	_____
<input type="checkbox"/> Third Adventure Package with Tape	\$21.90	\$11.95	_____
<input type="checkbox"/> Third Adventure Package with Disk	\$26.90	\$12.95	_____
<input type="checkbox"/> The Fourth Rainbow Book of Adventures	\$10.95	\$ 7.95	_____
<input type="checkbox"/> Fourth Adventures Tape	\$ 9.95	\$ 6.95	_____
<input type="checkbox"/> Fourth Adventures Disk	\$14.95	\$11.95	_____
<input type="checkbox"/> Fourth Adventure Package with Tape	\$20.90	\$13.90	_____
<input type="checkbox"/> Fourth Adventure Package with Disk	\$25.90	\$18.90	_____
<input type="checkbox"/> Introductory Guide to Statistics	\$ 6.95	\$ 2.95	_____
<input type="checkbox"/> Guide to Statistics Tape or Disk (indicate choice)	\$ 5.95	\$ 2.95	_____
<input type="checkbox"/> Guide to Statistics Package	\$12.90	\$ 4.95	_____
(indicate choice of tape or disk)			
Add \$2.00 per book Shipping and Handling in U.S.			
Outside U.S., add \$4 per book			
Kentucky residents add 5% sales tax			
(Allow 6 to 8 weeks for delivery)			
Total		_____	

Mail to: Rainbow Bookshelf, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. To order by phone (credit card orders only) call (800) 847-0309, 8 a.m. to 5 p.m. EST. For other inquiries call (502) 228-4492.

Please note: The tapes and disks offered by The Rainbow Bookshelf are not stand-alone products. That is, they are intended to be an adjunct and complement to the books. Even if you buy the tape or disk, you will still need the appropriate book for loading and operating instructions. OS-9 is a registered trademark of the Microwave Systems Corporation.

**FILL OUT
YOUR COCO
LIBRARY
WITH
THESE
SELECTIONS**

...Just think of any word processing feature, chances are Word Power has it...packs a lot of features...excellent word processor..." **Word Proc. Comparison**-April 1989 Rainbow; Pg 26.



Word Power 3.3

The Best Just Got Better!

"...friendly...amazing execution speed...much easier to use than VIP software & 2 other systems I've tried...very user friendly...highest among word-processors"-Rainbow Oct 88 Rev.



SPEED

Blazing Fast! Runs at **2 Mhz** and uses the standard text screens for lightning fast execution.



MEMORY

Word Power 3.3 allows **72K** of workspace on a 128K CoCo and **460K** on a 512K CoCo. More memory than any other word processor. Period.



DISPLAY

Choice of **40** or **80** columns with your choice of colors. Can be used with RGB/Composite/Monochrome Monitors and TV. Pull down menus, plain english prompts, on-screen underlining and page break display make it a breeze to use!



EDITING

Powerful full-screen editor w/ word-wrap. 4-way cursor, scrolling; Line Positioning; Block Commands; Search, Replace; OOPs recall during delete, adjustable key-repeat, key-click, typeahead, Tabs, Word-Count and much more! . Built-in extensive **HELP** screen can be accessed anytime during edit.



SPOOLER

Print and Edit documents at the same time!



SORTING

Sort lists in a flash!



GRAPHICS

Insert **graphics** in your documents! Allows you to import PMode 3/4, HSCREEN and CoCo Max II/III pictures!



CALCULATOR

Built-in 4 function calculator!



2 COLUMN PRINTING

Align your text in 2 columns with a few keystrokes!



SPLIT-SCREEN EDITING

Freeze a portion of text and edit another. Its fantastic!



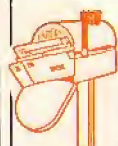
SAVING / LOADING

Creates ASCII files that are compatible with other word-processors, terminal programs, etc. Allows directory point & select for easy loading/saving. **Automatic Backup**, file erase, free space display. **ARE YOU SURE?** prompts prevent accidental deletes. The **Auto-Save** feature automatically saves text to disk during user-defined intervals for peace of mind. Supports double-sided drives.

MACROS



Playback up to 250 keystrokes with a single key! Automate multiple tasks with a single key! You'll love it!



MAIL MERGE

Type a letter, follow it with a list of names & addresses and have Word Power print out personalized letters. Its that easy!



SPELLING CHECKER

Word Power 3.3 include a **80,000** word spelling checker which finds and corrects mistakes in your text.



PRINTING

Works with **all** printers that work with the CoCo. Allows options such as baud rates, spacing, page/print pause, partial print, page numbering/ placement, linefeeds, multi-line headers/footers, right justification and number of copies. The values of these options can be changed in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear on the printer. You can view margins, page breaks, justification and more.



PUNCTUATION CHECKER

This checker will proofread your text for punctuation errors such as capitalization, double-words, a/an usage, spaces and more. Its the perfect addition to any word-processor.



\$79.95 DOCUMENTATION

Word Power 3.3 comes with a well-written instruction manual & reference card which makes writing with Word Power as easy as pie. Word Power 3.3 comes on an unprotected disk.

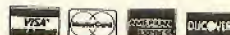
FREE T-SHIRT

with full order of Word Power 3.3. (Specify Size)

Upgrade Policy: Word Power 3.2 owners can get Word Power 3.3 by sending original Word Power disk and \$15 to the address listed below.



MICROCOM SOFTWARE, 2900 Monroe Ave, Rochester, NY 14618



All Word Power 3.3 orders shipped by UPS 2nd Day Air at No Extra Charge in Continental US.

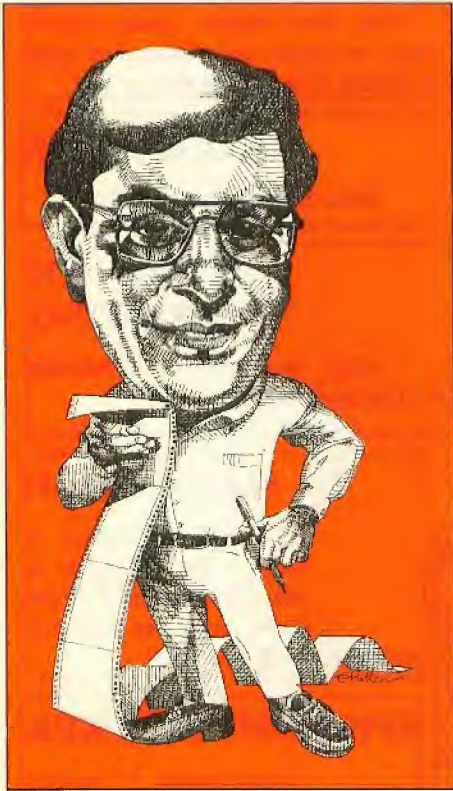
For Detailed Order Information, refer to Page 17 of our 6-page Ad series (Pgs 7-17).

To Place Credit Card Orders Call Toll Free **1-800-654-5244** (9am-8pm 7 days/week)

Technical Support (4-8pm), Order Status, Info, Technical Info; 716-383-8830



Let Us Entertain You



uct on a yearly basis just so people would buy them, even if they did not need to do so. Hue and cry to the contrary, automakers still do this to an extent.

Computer manufacturers generally do not have to worry about planning obsolescence. In an industry that really is (to use another cliché) on the cutting edge of technology, things change so fast that the latest thing in the morning may be old hat by afternoon. We get caught up in it, and we shouldn't.

The Color Computer you are using today is a perfect example. For whatever purposes you plan to use a computer, a Color Computer can serve them so well that it would simply boggle the mind of people who in the late '50s and early '60s laid out in excess of \$1 million for a room-sized behemoth that took high-priced tech-types in white lab coats to operate. Whether you wanted to write letters, publish newsletters, move figures around and play "what if," communicate across the continent, or just simply be entertained, an original CoCo with 64K, Extended Color BASIC and a tape recorder for mass storage was a vastly superior machine to an IBM- or UNIVAC-whatever mainframe of that era.

Since the theme of this month's RAINBOW is entertainment, let's consider entertaining ourselves with a computer. In a truly significant achievement of programming and imagination, the game *Adventure* appeared on a mainframe one day, written in FORTRAN. Will Crowther and Don Woods wrote it and it took thousands of lines of code, was entered originally with punch-cards, and probably cost tens of thousands of dollars in computer time to develop.

Yet it was a simple game, a text *Adventure*. The games in the *Rainbow Book of Adventures* series are, on the whole, far more complex and more entertaining. Many of them are graphics *Adventures*, as are the vast majority of the *Adventure* programs available commercially. These are so far beyond the scope of a huge mainframe it boggles the mind.

All of this is by way of saying that your present Color Computer, be it an original,

a CoCo 2 or a CoCo 3, most likely has far more power than you can possibly use. For the vast majority of applications, there is something swifter and neater available on another computer system, but it really is all relative.

If you can write your letters, school papers, reports, columns and the like with a word processor on the CoCo, why, exactly, do you need another computer? I am willing to bet the CPU in your CoCo is always waiting for you to input information; it is merely relative as to whether you need something more.

For those of you who do, technically speaking, there are options available through third parties that give you a "CoCo 4" environment. The obvious advantage to this is that these options allow you to move to new frontiers while staying within the CoCo area. For those of you not so technically inclined, a non-Tandy upgrade path gives you something to consider as you look at future needs.

It is interesting: Two of the sensations last year in the MS-DOS market were *Ami* and *Word for Windows*, which use the graphics environment of Microsoft *Windows* to show formatting on-screen for word processing. Howard Cohen's *Telewriter* did that so many years ago I have lost count. And *Telewriter* still does it faster.

Val Burke of Red Oak, Georgia, writes to point out that I erred in proclaiming 1990 as the "beginning of the new decade" in the March issue. Val points out the Latin numbering system we use started with the year A.D. 1, not A.D. 0; thus, 1991 is the proper start of the "new decade."

Val is right and the same goes for the new millennium, which will really begin with 2001 rather than 2000.

Whichever year you choose to celebrate (I predict most of us will opt for both), I predict your CoCo will still be useful to you then.

— Lonnie Falk

Since the subject of this June issue is Entertainment and so many of us became interested in the CoCo because we wanted to be entertained in some way, it is appropriate for me to talk about the CoCo and its value to you right now.

What has always amazed me is the great rush and panic many of us seem to feel about *new* and *better* and *more* in the computer world. Indeed, the only thing comparable to the new-computer itch is the new-car itch. You know, the new models are out and you just gotta shop. If you don't think this is true, look at a September issue of, say, *Sports Illustrated* and notice the number of automobile advertisements vis-a-vis other advertising.

Around the 1950s there was a great hue and cry about planned obsolescence. This was particularly directed at automakers charged with making changes in their prod-

Programming Secrets Galore

Pokes, Peeks and Execs are your guides into the jungle of computer programming. These commands give you the power of Machine Language without leaving the security of BASIC. Each book is a collection of "inside" information, with explanations and examples to help you immediately put it to use. Everyone from the novice to the professional will find these handy books a wealth of information.

300 POKES, PEEKS, 'N EXECS for COCO III

- *40/80 column Screen Text Dump
 - *Save Text/Graphics Screen to Disk
 - *Command/Functions Disables
 - *Enhancements for CoCo3 BASIC
 - *128K/512K RAM Test Program
 - *HPRINT Character Modifier
- Only \$19.95

500 POKES PEEKS, 'N EXECS

- *Autostart your BASIC programs
- *Disable Color BASIC/ECB/Disk BASIC commands
- *Disable Break Key/ Clear Key/ Reset Button
- *Generate a Repeat-key
- *Transfer ROMPAKs to tape
- *Set 23 different GRAPHIC modes
- *Merge two BASIC programs
- *And much much more!!!

For CoCo 1,2 and 3. Only \$16.95
ALL 3 BOOKS for: \$39.95

SUPPLEMENT TO 500 POKES, PEEKS, 'N EXECS

- 200 additional Pokes,Peeks and Execs (500 Pokes Peeks 'N Execs is a prerequisite)
- *ROMPAK transfer to disk
- *PAINT with 65000 styles
- *Use of 40 track single/double sided drives
- *High-speed Cassette Operation
- *Telewriter, CoCo Max enhancements
- *Graphics Dump (for DMP printers)
- /Text Screen Dump

For CoCo 1,2 or 3. Only \$9.95

UNRAVELLED SERIES

An invaluable aid for Basic and Machine Language programmers, these books provide a complete disassembly and annotated listing of the BASIC/ECB and Disk ROMs. These listings give complete, uninterrupted memory maps of the four ROMs. Gain complete control over all versions of the color computer.

EXTENDED COLOR BASIC UNRAVELLED: COLOR BASIC and EXTENDED BASIC ROM Disassembly: \$39.95
DISK BASIC UNRAVELLED: DISK BASIC ROM 1.1 and 1.0 Disassembly: \$19.95

BOTH ECB AND DISK BASIC UNRAVELLED: \$49.95

SUPER EXTENDED BASIC UNRAVELLED: SUPER EXTENDED BASIC ROM Disassembly for CoCo 3. \$24.95

COMPLETE UNRAVELLED SERIES (all 3 books): \$59.95

COCO LIBRARY

CoCo 3 Service Manual: \$39.95

CoCo 2 Service Manual: \$29.95

Start OS9 Book + Disk: \$32.99

Inside OS9 Level II: \$29.95

Rainbow Guide To OS9 Level II: \$19.95

Rainbow Guide To OS9 Level II Disk: \$19.95

Complete Rainbow Guide To OS9: \$19.95

Complete Rainbow Guide to OS9 2 Disks: \$29.95

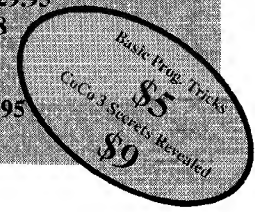
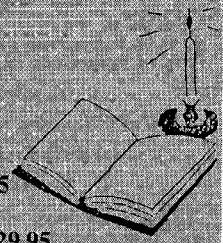
Assembly Language Programming (tepeco): \$18

Addendum For CoCo3 (tepeco): \$12

Color Computer Disk Manual: \$29.95

Multipak Service Manual (Specify Model): \$19.95

Disto Turn of the Screw Book: \$19.95



GAMES

(CoCo 1,2,3 Disk unless otherwise specified; min 32K)

Warrior King (CoCo 3): \$29.95

In Quest of the Star Lord (CoCo3): \$34.95 Hint Sheet: \$3.95

Hall of the King 1,2,3: \$29.95 ea Trilogy: \$74.95

Kung Fu Dude: \$24.95

Dragon Blade: \$19.95 Champion: \$19.95

White Fire of Eternity: \$19.95

Quest for the Spirit Stone (CoCo 3): \$18

Sinistaar (512K Req): \$34.95 Kyum-Gai (CoCo 3): \$29.95

Paladin's Legacy: \$24.95

Slots & Cards (CoCo 3): \$39.95

Leisure Suit Larry (512K CoCo 3): \$49.95

TREASURY PACK #1: Lunar Rover Patrol, Cubix, Declathon, Qix, Keys of Wizard & more. Only \$29.95

TREASURY PACK #2: Lancer, Ms. Gobbler, Froggie, Madness & Minotaur, Ice Castles, Galagon, Devious. Only \$29.95

SPACE PAC: Color Zap, Invaders, Planet Invasion, Space Race, Space War, Galax Attax, Anaroid Attack, Whirlybird, Space Sentry & Storm Arrows. Only \$29.95

Classic Pack: Treasury Pack 1,2 & Space Pac: \$74.95

Overlord (CoCo 3): \$29



WIZARD's CASTLE: A hi-res graphics adventure game filled with tricks, traps and treasures. Min 64K. Only \$19.95

Mine Rescue (For CoCo 3): \$24.95 The Seventh Link: \$38

Caladuril 2: Weatherstone's End: \$54

Speed Racer: Buckle your seatbelt and get ready to race in this Pole Position® type game. Only \$34.95

Pinball Factory: Design, Build, Edit and Play the classic game of Pinball. Min 64K. Only \$34.95

Demon Seed: Battle the diving & bloodthirsty bats. \$19.95

Cashman: Explosive color, fast-moving animation and amazing sound-effects! Has over 40 levels! \$29.95

Fury: An action packed airborne dogfight simulation. \$29.95

Time Bandit: Fight the Evil Guardians, Killer Smurphs & more. Full animation & over 300 screens. \$29.95

Rommel 3D: Exciting 3-D Tank Combat Game. CoCo 2. \$34.95

Outhouse: One of the funniest, most original games. Excellent graphics, sound effects & playability. \$19.95

Mudpies: Crazy circus fun! Only \$29.95

Those Darn Marbles: \$32 (Req 512K)



MICROCOM SOFTWARE 2900 Monroe Ave, Rochester, NY 14618

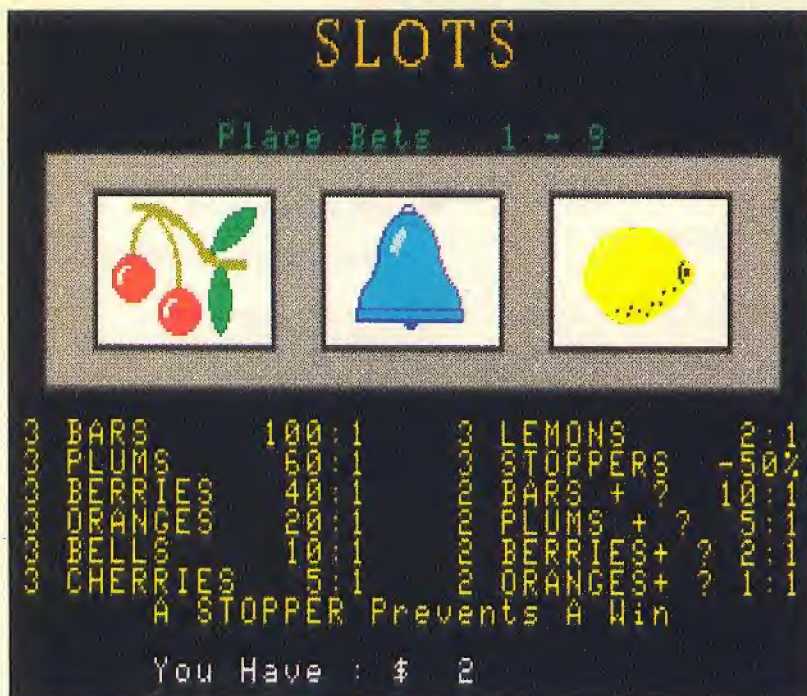
To Order: Refer to Page 17 of our 6-page series (Pg. 7-17).



Credit Card Toll Free Orderline: 1-800-654-5244
(9AM-8PM 7 Days/week)

Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. Fax: 716-383-0026.





*A slot machine game
for the CoCo 3*

VEGAS at Your Fingertips

by John Mosley

Many people like playing slot machines but nobody likes losing money to them. *Slots* is a compromise. It simulates a real slot machine on a 128K CoCo 3 and doesn't require real money to play.

The main portion of the program is written in BASIC, but there is a machine language subroutine built in to create a smooth, realistic effect. There are eight 16-color symbols: cherries, oranges, bars, plums, bells, strawberries, lemons and stoppers. You can bet from one to nine dollars and win up to 100 times what you've

bet. However, if you get even one stopper (the circle with a slash), you don't win anything; if you get three stoppers, you lose half of everything you have.

To play the game, type in the listing, save it and run it. Be sure to save it before running it, because a mistake in a data statement can crash the computer. After you run *SLOTS*, you are asked what kind of a monitor you have. Then you are able to play. When you get to the playing screen, the amount of money you have determines your maximum bet. However, the program requires all bets to be between \$1 and \$9. You will always have at least two dollars.

After the wheels spin around a few times, the machine comes to a stop. Various ways to win and the payoffs for each winning combination are listed on the screen. The computer then adds what you've won to your score, and you can bet again. Enjoy *Slots* — it's a lot of fun to play, and you don't lose any money!

□

John Mosley, a junior at Portland High School, enjoys programming games, especially those using sound and graphics. He can be contacted at 420 Main St., Portland, CT 06480. Please include an SASE when requesting a reply.

COCO UTILITIES GALORE

(For CoCo 1,2,3 RSDOS; Min 32K Unless Otherwise Specified)

Super Tape/disk Transfer

Transfers Tape-To-Disk, Disk-to-Tape, Disk-to-Disk, Tape-To-Tape. Only \$24.95

Mailist Pro

Add, Edit, View, Print (Select/All), Sort Mailing Labels. Only \$19.95

Computerized Checkbook

Add, View, Search & Print Checkbook Entries for savings/ checking & other accounts. Only \$19.95 \$14.95

CoCo 3 Screen Dump

32/40/80 column, PMODE 3/4 dump. Take snapshots of screens while program is running! For DMP & Epson/ Gemini/ Star & Compatibles. Only \$19.95 (CoCo 2 compatible)

RGB Patch

Displays most graphics in Color on RGB Monitors. For CoCo 3. Only \$24.95

From GimmeSoft...

FKEYS III: \$19.95
SixDrive: \$16.95

Disk Label Maker

Design Professional labels. Allows expanded, normal, condensed text w/ Double-Strike & Borders. Supports DMP, Star, Gemini, Epson & Comp. Printers. Only \$19.95

Disk Utility 2.1a

Only \$19.95

Bowling Score Keeper

For Team & Individuals. \$19.95

Vcr Tape Organizer

Organize your videos. \$19.95

Home Bill Manager

Organize your Bills. Only \$12.95

Calendar Maker

Calendr & Appts. Only \$12.95

From Cer-comp...

Window Master: Windowing Environment for CoCo 3. \$69.95 w/ HiRes: \$79.95

Window Writer: \$59.95

Window Basic Compiler: \$99

Window ED/TASM: \$49.95

Font/Icon Editors: \$19.95

Advanced Prog. Guide: \$24.95

CBASIC: Basic Compiler. Specify CoCo 1,2 or 3. Only \$149.95

The Source: Best Disassembler. Specify CoCo 1,2 or 3. \$49.95

EDT/ASM: Best Assembler. Specify CoCo 1,2,3. \$59.95

Telewriter 64

Best Word Processor for CoCo 2. Disk: \$57.95 Cas: \$47.95

Autoterm

Best Terminal Software. Disk: \$39.95 Cas: \$29.95

From Dr. Preble®

Vocal Freedom: \$34.95

Mental Freedom: \$24.95

Hacker's Pac: \$14.95

From Danosoft...

DISK UTILITIES

Use all 360K from your double sided drive & more. \$17.95

MEMORY MASTER

Run 2 programs at once, fix disks, scan, edit memory. \$24.95

BIG RAMDISK

In memory disk drive. Simulates 80/40/35 track drives. Req 512K. Only \$12.95

Vterm

Terminal Software w/ VT Emulations and much more. CoCo 3 Only. Only \$39.95

Basic Windows

By Kevin Berner

Run 6 Basic Programs at the same time! Req. 512K. \$39.95

Studio Works

Superb Digital Audio Sampler. Great for Special Effects. Only \$39.95. w/ Cable: \$54.95

Super 88 Utilities

88 must-have utilities for every RSDOS user. Only \$88

Window Writer

Powerful OS9 word processor with multi-tasking, pull down menus & much more. Only \$59
DynaSpell: 102,000 word spelling checker! Only \$19.95

RSB v1.3

The revolutionary program that allows you to use Basic under OS9 Level II to take advantage of features. Only \$39.95

Start OS9

An excellent hands-on guide to OS9 Level II for the beginner. Req 512K, 2 Drives & Monitor. Book & Disk Only \$32.99

From Alpha Software®

OS9 Level II BBS V3.0: The absolute best BBS program for OS9. Even comes with its own terminal Program. Req. 512K & RS232 Pack. Only \$29.95

Level II Tools: 25 utilities such as windowing, wildcards, tree and more. Only \$24.95

Disk Manager Tree: Change, copy, view, create directories with ease. Req 512K. \$29.95

Warp One: Complete Level II Windowing Terminal. Req 512K & RS232 Pack. Only \$34.95

The Zapper: Patch Disk Errors. Disk Only \$19.95

Multi-Menu: Create your own pop-down windows. Req 512K and Multi-View. Only \$19.95

Presto Partner: Have a notepad, calculator, calendar, phone book, RT clock & more at your fingertips. 512K Req. \$29.95

From R3 Systems®

Screen Control Utility: Gain Complete control of your text screen. Only \$19.95

Menuing Utility: Complete memory resident menuing system. Only \$19.95

Point & Shoot File Selection: Only \$19.95

Multi-Edit

Create, Edit Application Information Files & Icons for Multi-View. Only \$24.95

Transfer Utilities

GSC File Transfer: Transfer files from MSDOS / OS9/ RSDOS & Flex. Req OS9 (Level II for Multivue Ver.), 2 drives, SDISK/SDISK3. Standard Version: \$44.95. Multivue Version: \$54.95

SDISK3: Standard drive replacement module allows use of 40/80 DS/DD drives. Includes Req. OS9 Level II. \$29.95
SDISK + BOOTFIX: \$34.95

PC-Xfer Utilities: Programs to format/transfer files to/from MSDOS disks to CoCo under Level 1/2. Req SDISK(3): \$44.95

OS9 Ramdisk

Blazing fast in-memory disk drive! Req. CoCo 3. Disk Only \$29.95

Goldberg Utilities

Power-packed utilities w/ 15 useful commands such as sort, lost file location, disk pack & much more. Only \$24.95

Vol II: New utilities such as file compare, protection, sort, enhanced delete/move & much more. Only \$24.95.

From Burke & Burke®.

File System Repack: A must utility for every OS9 owner. Un-fragments your hard/floppy disk to speed up disk operation and reduce wear on drive heads. Only \$29.95

Wild & MV Version 2.1: Use "wildcards" with OS9 & re-arrange directory tree. \$19.95

EZGen Version 1.04: Powerful OS9 bootfile editor. Changes names, add/delete modules, patch bytes, etc. \$19.95

From Frank Hogg®...

Dynastar: Most Popular OS9 Word Processor. Only \$99.95

Both Dynastar & Spell: \$119.95

Wiz: Communications Program. Req RS232 Pack. \$59.95

From Sugar Software®

OS9 Calligrapher: Only \$24.95
Calligrapher Massager: \$19.95



MICROCOM SOFTWARE 2900 Monroe Ave, Rochester, NY 14618

To Order: Refer to Page 17 of our 6-page series (Pg. 7-17).

Credit Card Toll Free Orderline: 1-800-654-5244
(9AM-8PM 7 Days/week)

Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. Fax: 716-383-0026.





110 0	490 21	1020 150
140 32	530 208	1120 164
180 109	580 135	1210 45
240 52	620 79	1270 54
260 141	650 243	1360 186
300 69	670 128	1440 27
330 92	750 179	1550 116
370 250	800 16	END 253
410 207	850 169	
450 19	930 233	

The Listing: SLOTS

```

0 ' COPYRIGHT 1990 FALSOFT, INC
10 ' SLOTS
20 ' COPYRIGHT 1989
30 ' BY: JOHN MOSLEY
40 POKE65497,0
50 PCLEAR7
60 FORT=&HF00 TO &HF00+78
70 READ A$
80 A$="&H"+A$
90 POKE T,VAL(A$)
100 NEXTT
110 DATA 86,31,B7,FF,A2,8E,10,00
,10,8E,40,96,8D,18,8E,10,00,10,8
E,40,C0,8D,0F,8E,10,00,10,8E,40,
EA,8D,06,86,7A,B7,FF,A2,39,4F,CE
,00,00,E6,84,E7,A4,30,01,31,21,4
C,81,20,26,F3,4F,33,41
120 DATA 31,A9,00,80,11,83,00,28
,27,0A,8C,38,00,26,E2,8E,10,00,2
0,DD,39
130 CLS
140 PALETTE12,0:PALETTE13,18:INP
UT" MONITOR TYPE:
      0 - COMPOSITE
      1 - RGB
      " :M:FORT=0 TO 15:PALETTE,0
:NEXTT
150 HSCREEN2
160 POKE&HF06,&H33:POKE&HF07,0:P
OKE&HF0F,&H33:POKE&HF10,0:POKE&H
F19,0:POKE&HF2B,&HA4:POKE&HF2D,&
H84
170 Z=1:FORQ=&H10 TO &H33 STEP &
H5
180 POKE&HF18,Q
190 HCLS0:ON Z GOSUB 230,290,340
,400,440,470,530,600
200 EXEC &HF00
210 Z=Z+1:NEXTQ
220 POKE&HF2B,&H84:POKE&HF2D,&HA
4:HCLS15:GOSUB640:GOTO 820

```

```

230 ' CHERRIES
240 HDRAW"C13BM224,67;U3RND3U3FD
U3FU2RURUR2HR5GLFRDRDRDRD2ED2RD4
UED10RU7":HDRAW"BM225,54;R9DNL9R
3DNL6R2GNL5R4DNL4RFNL5FNL3FNL2FN
L2RFNL3FNL3DL2RFLR4FL5FR5DNL4R11
DNL12DNL9"
250 HDRAW"C1BM222,68;R5FRF3D4G3L
GL5HLH3U4E3RE":HPAINT(222,70),1,
1:HDRAW"BM239,77;R5FRF3D4G3LGL5H
LH3U4E3RE":HPAINT(239,79),1,1:HD
RAW"C0BM219,75;U2RND2URUR2":HDRA
W"BM236,84;U2RND2URUR2"
260 HDRAW"C8BM254,67;RER3ERERE2R
E3UEU2L5GL2GLG4DGDGD2":HPAINT(26
0,60),9,8:HDRAW"C8BM257,64;U2F2L
UER3HLUFER3HLUFUFE":HDRAW"BM257
,70;F2DFD2FD5GD2GDG2HUHU2HU5EU2
EUE2":HPAINT(257,72),9,8
270 HDRAW"BM257,73;DNF2NG2D3NF2N
G2D3NF2NG2D3NFNGD3"
280 RETURN
290 ' ORANGE
300 HDRAW"C7BM237,56;R12FR2FRF7D
FD8GDGDGDG4LGLGL2GL9HL3HLHLH5UHU
HU8EU2EUE4RERERE":HPAINT(237,58)
,7,7:HDRAW"C11BM230,65;DFU3ED3EU
3ED3EU2ED2RU2RDBR21BD7C15LG2D2F2
RBU2U2RD2"
310 X=230:Y=81:FORT=1 TO 26:READ
A,B:X=X+A:Y=Y+B:HSET(X,Y,15):NE
XTT
320 DATA 0,0,4,1,-2,1,4,1,3,-2,0
,3,2,-2,1,2,-2,2,4,0,-2,-2,3,0,-
1,-4,3,-1,1,2,1,1,-1,2,2,0,2,-2,
-1,-2,2,-2,2,1,-1,3,3,-5,1,1,1,-
3
330 RETURN
340 ' BAR
350 HCOLOR8:HLINE(216,58)-(271,8
5),PSET,BF:HCOLOR9:HLINE(219,60)
-(268,83),PSET,BF:HDRAW"C10BM272
,59;D27L55":HDRAW"BM226,77;U3NR5
BU5U3R5BR5BDD3GDFD5G3NL9BR5R2U3E

```

```

U3R5BU5BL3U2RBR4BDDFD2FD3FD4NL2B
R2R2U7R4BU5BL4U3R5BR5D4G2DFD5L
2"
360 HDRAW"C8BM223,80;R10E2U5HUEU
5H2L10D17E2R6E2UH2L6ND5BU3R6E2UH
2L6D5":HPAINT(224,72),8,8
370 HDRAW"BM237,80;U3EU3EU2EU2EU
E2RF2DFD2FD2FD3FD3L2U2HU3HL5GD3G
D2L2BU10BR5R3U3HLGND3U2FU2RD2ED2
":HPAINT(242,72),8,8
380 HDRAW"BM252,80;U17R10F2D5G2D
FDFD4L2U3HUH2L5D7L2U10BR2R6E2UH2
L6D5":HPAINT(257,72),8,8
390 RETURN
400 ' PLUM
410 HDRAW"C2BM242,66;L3GLGLG4DGD
GD3FDFDF4RFRFR9ERERE4UEUEU3HUHUH
4LHLHL3GL":HPAINT(242,77),2,2:HD
RAW"C0BM234,73FU2FU2FU2FU2F":H
DRAW"C12BM254,55;L5GLG3D3LD4RU4R
U3RURURUR6"
420 HDRAW"C8BM244,61;LU2H2L2HL10
G2F2R2DR2FR2FR4ER2U2":HPAINT(234
,58),9,8:HDRAW"BM241,60;L2NG2UNH
L2NH2NG2L3NGNH2L3HL"
430 RETURN
440 ' BELL
450 HDRAW"C3BM224,85;R38U3HU2HUH
4HUHUHU3HUHUH4LHNL6H2L2G3LG4DGDG
D4GDGDG4DGD2GD3":HPAINT(241,70),
4,3:HDRAW"BM224,82;R38D3L17DL4FR
2":HDRAW"C5BM236,66;RFUHLR3UL2UR
3UL2R3UL2E"
460 RETURN
470 ' STRAWBERRIES
480 HDRAW"C1BM223,63;D2GDGDGD6FD
FDF3R6ERE2UEUEUEU7HU4L15":HPAINT
(231,70),1,1:HDRAW"BM247,66;D2GD
4GD6FDF2R2FR6ERE3UEU3EU5HUHUH3L8
G4":HPAINT(251,75),1,1
490 HDRAW"C8BM240,64;L6NHD5HUH2U
HLD2GD2GHU5L2GL4ERE2RER9F2RFRFB8
5BD3R2E2R2EFD4FND2EU5DF3DF3U5HU3
F2RFRFR2HLUH3LHL10G6":HPAINT(255

```


DISTO PRODUCTS

All Disto Products now carry a 1-Year Warranty and are shipped **2nd Day Air** (at no extra charge!) within Continental US. All Disto Add-Ons (& Super Controller II) include OS9 Drivers, unless otherwise specified.

- Disto Mini Controller (with RSDOS or CDOS) : \$74.95
- Disto Super Controller (with RSDOS or CDOS): \$99.95
- Disto Super Controller II (with RSDOS or CDOS): \$129.95
 - Mini Eprom Programmer Add On: \$54.95
 - Hard Disk Adapter: \$39.95 w/ RS232: \$69.95
- RT Clock & Printer Interface: \$34.95 (OS9 Driver: \$19.95)
- 3-in-1 Multiboard Adapter: Parallel Port, RT Clock & RS232 Port. \$74.95
 - MEB Adapter II: \$34.95
- 4-in-1 Board: Parallel Port, RT Clock, RS232 & Hard Disk Interface: \$129.95

RS232 Super Pack: True RS232 Port for your CoCo! Compatible with Tandy® RS232 Pack. Includes DB25 Cable. 100% Compatible with OS9 ACIA Software. Req. Multipak. Only \$54.95

Drive 0
\$199



DRIVES

2 Drive System
\$299

There are a lot of dealers selling disk drives for the CoCo. Why buy from us? **First**, all our drives are **BRAND NEW DOUBLE SIDED** Drives. They are sleek, fast (6ms!), quiet and have a reputation of superb performance and reliability. **Second**, our Drive 0 & 2 Drive Systems come with the acclaimed DISTO Controller - with gold plated contacts & built-in ROM which allows you to access **BOTH** sides of our drives!. **Third**, our Drive 0 & 2 Drive Systems come with the **Official** 200 page Radio Shack Disk Manual. **Fourth**, you get \$50 worth of our utility software (Disk Util 2.1A & Super Tape/Disk Transfer). Our drive systems are head & shoulders above the rest!

- Drive 0 (with Disto Controller, Case, Power Supply, 1 Drive Cable, Manual, Software): **\$199**
- Drive 1 (with Case, Power Supply & Software): **\$129** Bare 5 1/4" Drive: **\$89**
- 2 Drive System (With Disto Controller, Case, Power Supply, 2 Drive Cable, Manual & Software): **\$299** Full-Height Case/Power Supply: **\$59.95** Power Splitter: **\$9.95**
- 1 Drive Cable: **\$16.95** 2 Drive Cable: **\$22.95** 4 Drive Cable: **\$34.95**
- FD501 Upgrade Kit: Bare Drive, 2 Drive Cable & Instructions: **\$109**
- FD502 Upgrade Kit: Bare Drive, 2 Drive Cable, Power Cable & Instructions: **\$119**
- Toshiba 3 1/2" 720K Drive w/ Power Supply & Case: **\$149** 3 1/2" Bare Drive: **\$99**

More Good Stuff...

DS69B Digitizer: Use your CoCo to display pictures from your VCR. Comes complete with CSEE Software. Only **\$149.95**. CoCo 2 Version: **\$99.95**

Advanced Gravis Joystick: Features tension, rotary-centering, free floating controls with 3 buttons. Only **\$59.95**

MPI Locking Plate

(Specify CoCo 2/3 and 26-3024/3124): **\$8**

5 1/4" DS/DD Disks: **\$.40 each**

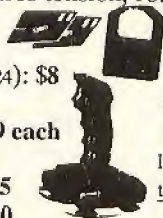
5 1/4" Colored DS/DD Disks: **\$.89 each**

3 1/2" DS/DD Disks: **\$1.29 each**

5 1/4" Disk Case (for 70 disks): **\$9.95**

3 1/2" Disk Case (for 40 disks): **\$7.50**

Black Ribbon: **\$8.50** NX1000 Colr Rib.: **\$12.95**



Microcom Serial to Parallel Interface

- Drive your printer at high speed (300-9600)
- Designed by Marty Goodman so you know its quality.
- Unlike other similar converters, this uses CRYSTAL oscillator which is VERY reliable at higher baud rates and different temperatures.

Only **\$44.95**

w/ Serial Modem Switch: **\$54.95**

NEW

HARD DRIVES, Etc.

Systems w/ Seagate Hard Drive, Controller, Cables, CoCo XT Interface, Cables, Case (with fan & Power Supply), Software (OS9 Software & HYPERIO Software!) & Instruction Manuals. Assembled/Tested/Formatted. Just *Plug'N'Run*. Req. Multipak.

Disto Hard Drives Systems Also Available!

Seagate 20 Meg System: **\$509**

Seagate 30 Meg System: **\$539**

40 Meg OS9 System \$599

CoCo XT: Use 2 5-120 Meg Drives with your CoCo. Only **\$69.95** w/ Real Time Clock: **\$99.95**

CoCo XT ROM: Boots OS9 from hard/floppy. Only **\$19.95**

HYPERIO: Allows Hard Drive use with RSDOS. Only **\$29.95**.

HYPERIO Disto Version. Only **\$29.95**

HYPERIII: RAMDisk & Spooler to CoCo 3 HYPER I/O. **\$12.95**

HYPERIO Utilities (by Kevin Berner)

Hard Drive Utilities: MSA Backup, Copy/Kill/Rename, Hard Disk Backup to Floppies (vica versa) & more. Only **\$21.95**

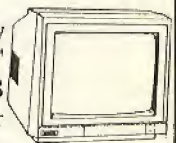
Disk Doctor: Checks/locks out bad sectors. only **\$17.95**

Hard Drive Zap: View tracks, sectors, modify data on your hard disk. Only **\$21.95**

MAGNAVOX 1CM135 RGB

Monitor

Razor Sharp picture quality for your CoCo! Has 14" Screen, Analog/TTL RGB & Composite Inputs for CoCo 2/3, Stereo Sound, Text Display Switch, Tilt Stand & 2 Year Warranty. Compatible with CoCo, IBM & many other computers! Only **\$298** (add \$12 S&H/\$40 in Canada)



Magnavox RGB Cable for CoCo 3 and Composite Video / Audio Cable Set with Purchase of Monitor: **\$19.95**

MAGNAVOX 7622 12" AMBER MONITOR: 80 Column Mono Monitor w/ Speaker: Only **\$98** (Add \$8 S&H in US)

512K CoCo 3

Brand new **Color Computer 3** with **512K Installed and tested!** Comes with complete manuals and \$100 worth of software!

Only **\$259**

Please Add **\$10 S&H**
512K Installat. Voids Warranty



MICROCOM SOFTWARE 2900 Monroe Ave, Rochester, NY 14618

To Order: Refer to Page 17 of our 6-page series (Pg. 7-17).

Credit Card Toll Free Orderline: 1-800-654-5244
(9AM-8PM 7 Days/week)

Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. Fax: 716-383-0026.




```

.62),9.8:HPAINT(231,62),9.8
500 X=224:Y=69:FORT=1 TO 30:READ
A,B:X=X+A:Y=Y+B:HSET(X,Y,15):NE
XTT
510 DATA 0,0,-2,3,4,0,-2,2,2,3,-
1,3,4,-1,0,-4,0,-5,2,8,2,-4,-1,-
3,4,0,-1,-6,17,4,-2,3,3,0,-1,3,-
3,2,2,3,4,-1,1,4,0,-7,0,5,1,-3,-
1,-3,-1,-4,2,2,2,2,1,2
520 RETURN
530 ' LEMON
540 HDRAW"C11BM263,70:D3G7LGLGLG
LGL2GL10HLHLH4LH3U5EUEUE4RERER2E
R12FR2FRFRF8":HPAINT(244,64),11,
11:HDRAW"C15BM261,71:DLUBU2BLGD3
F"
550 X=225:Y=72:FORT=1 TO 11:READ
A,B:X=X+A:Y=Y+B:HSET(X,Y,0):NEX
TT
560 DATA 0,0,2,-2,0,-2,3,-1,-2,-
2,5,0,-2,-1,4,-1,-2,-1,4,0,4,-1
570 X=235:Y=82:FORT=1 TO 9:READ
A,B:X=X+A:Y=Y+B:HSET(X,Y,15):NEX
TT
580 DATA 0,0,4,1,1,-2,3,1,3,1,2,-
3,3,0,1,-3,4,-1
590 RETURN
600 ' STOP
610 HDRAW"C6BM238,55:R10FR2FRFRF
5DFDFD9GDGDG5LGLGL2GL10HL2HLHLH5
UHUUHUEUEUE5RERER2EBD4R10FR2FRFG
LG2LG2LG2LG3LG2LG2LG3HUHU9EUE4RE
R2E":HDRAW"BM256,64:G3LG2LG2LG2L
G2LG3LG2LGFRFR2FR10ER2ERE4UEU9HU
H"
620 HPAINT(241,57),6.6:HDRAW"C14
BM229,76:U9EUE3RER2ER10BR8BD5G3L
G2LG2LG2LG2LG3LG2LBD8BR7R8ER2ERE
RE6UEUEU7"
630 RETURN
640 HCLSL5:HCLOR14:HLIN(42,50)
-(109,93),PSET,B:HLIN(126,50)-(
193,93),PSET,B:HLIN(210,50)-(27
7,93),PSET,B:HLIN(24,40)-(295,1
03),PSET,B:HPAINT(26,42),6,14
650 HCLOR11:HPRINT(2,14),"3 BAR
S 100:1":HPRINT(2,15),"3 PLU
MS 60:1":HPRINT(2,16),"3 BER
RIES 40:1":HPRINT(2,17),"3 ORA
NGES 20:1":HPRINT(2,18),"3 BEL
LS 10:1":HPRINT(2,19),"3 CHE
RRIES 5:1":HPRINT(22,14),"3 LE
MONS 2:1"
660 HPRINT(22,15),"3 STOPPERS -
50%":HPRINT(22,16),"2 BARS + ?
10:1":HPRINT(22,17),"2 PLUMS + ?
5:1":HPRINT(22,18),"2 BERRIES+
? 2:1":HPRINT(22,19),"2 ORANGES
+ ? 1:1":HPRINT(8,20),"A STOPPER
Prevents A Win"
670 HCLOR9:HPRINT(11,4),"Place
Bets 1 - 9":HCLOR0:HPRINT(8,2
2),"You Have : $"
680 DIM N$(4)
690 N$(1)="-BL8R3GND11LD11LR8U2G2
"
700 N$(2)="-BL4L5FL2DLGND6RD7RDR2
DR4URERENU6LU7LUL3"
710 N$(3)="-D2H2L4DL3RDR2GR3DRDR
D2GLDL4ULU2"
720 N$(4)="-D2HUL10D2E2R3D12LR3LU
12"

```

```

730 HDRAW"C7BM165,4:"+N$(2)
740 HDRAW"BM147,4:"+N$(1)
750 HDRAW"BM132,4:"+N$(3)
760 HDRAW"BM182,4:"+N$(4)
770 HDRAW"BM196,4:"+N$(3)
780 GOSUB1520:RETURN
790 IF M=0 THEN PALETTE0,63:PALE
TTE1,7:PALETTE2,9:PALETTE3,11:PA
LETTE4,28:PALETTE5,60:PALETTE6,3
2:PALETTE7,37:PALETTE8,17:PALETT
E9,33:PALETTE10,1:PALETTE11,51:P
ALETTE12,5:PALETTE13,20:PALETTE1
4,16:PALETTE15,0
800 IF M=1 THEN PALETTE0,63:PALE
TTE1,36:PALETTE2,45:PALETTE3,9:P
ALETTE4,25:PALETTE5,59:PALETTE6,
56:PALETTE7,52:PALETTE8,16:PALETT
E9,18:PALETTE10,2:PALETTE11,54:
PALETTE12,34:PALETTE13,48:PALETT
E14,7:PALETTE15,0
810 RETURN
820 ' MAIN ROUTINE
830 POKE&HF06,&H10:POKE&HF0F,&H1
0:POKE&HF18,&H10:EXEC&HF00:GOSUB
790
840 X=&H1000:Y=&H1000:Z=&H1000:S
=2
850 I$=INKEY$:IF I$="" THEN 850
860 I=VAL(I$):IF I=0 THEN 850
870 IF I>S THEN SOUND1,2:GOTO 85
0
880 SOUND100,1:S=S-I:GOSUB1520
890 PLAY"V3101T20L40:CDEFGABCDEF
GABCDEFGABCDEFGABCDEFGABCDEF
GABCDEF"
900 E=RND(-TIMER):E=INT(RND(8)):
F=INT(RND(8)):G=INT(RND(8))
910 FORT=1 TO 32
920 X=X+&H280:Y=Y+&H280:Z=Z+&H28
0
930 GOSUB1540:NEXTT
940 J=(E-1)*&H500+&H1000:K=(F-1)
*&H500+&H1000:L=(G-1)*&H500+&H10
00
950 E=E+1:F=F+1:G=G+1
960 IF E=9 THEN E=1
970 IF F=9 THEN F=1
980 IF G=9 THEN G=1
990 IF X=J THEN 1000 ELSE X=X+&H
280:Y=Y+&H280:Z=Z+&H280:GOSUB154
0:GOTO 990
1000 FORT=1 TO 2
1010 X=X+&H140:Y=Y+&H280:Z=Z+&H2
80:GOSUB1540
1020 NEXTT
1030 FORT=1 TO 3
1040 X=X+&H40:Y=Y+&H280:Z=Z+&H28
0:GOSUB1540
1050 NEXTT
1060 FORT=1 TO 5
1070 X=X+&H20:Y=Y+&H280:Z=Z+&H28
0:GOSUB1540:NEXTT
1080 FORT=1 TO 16
1090 Y=Y+&H280:Z=Z+&H280
1100 GOSUB 1540
1110 NEXTT
1120 IF Y=K THEN 1130 ELSE Y=Y+&
H280:Z=Z+&H280:GOSUB1540:GOTO 11
20
1130 FORT=1 TO 2
1140 Y=Y+&H140:Z=Z+&H280
1150 GOSUB1540:NEXTT

```

```

1160 FORT=1 TO 3
1170 Y=Y+&H40:Z=Z+&H280:GOSUB154
0:NEXTT
1180 FORT=1 TO 5
1190 Y=Y+&H20:Z=Z+&H280:GOSUB154
0:NEXTT
1200 FORT=1 TO 16
1210 Z=Z+&H280:GOSUB1540:NEXTT
1220 IFZ=L THEN 1230 ELSE Z=Z+&H
280:GOSUB1540:GOTO 1220
1230 FORT=1 TO 2:Z=Z+&H140:GOSUB
1540:NEXTT
1240 FORT=1 TO 3:Z=Z+&H40:GOSUB1
540:NEXTT
1250 FORT=1 TO 5:Z=Z+&H20:GOSUB1
540:NEXTT
1260 IF E=F AND E=G AND E<>8 THE
N PLAY"03CEFGGAB04CEFGAB05CEFG
AB03CEFGAB04CEFGAB05CEFGAB01C
DEFGAB02CEFGAB03CEFGAB04CEFGA
B05CEFGAB" ELSE GOTO 1350
1270 IF E=1 THEN S=S+I*5
1280 IF E=2 THEN S=S+I*20
1290 IF E=3 THEN S=S+I*100
1300 IF E=4 THEN S=S+I*60
1310 IF E=5 THEN S=S+I*10
1320 IF E=6 THEN S=S+I*40
1330 IF E=7 THEN S=S+I*2
1340 GOTO 1510
1350 IF E=8 AND F=8 AND G=8 THEN
PLAY"05BAGFEDC04BAGFEDC03BAGFED
C02BAGFEDC01BAGFEDC":S=S/2:GOTO
1510
1360 IF E=8 OR F=8 OR G=8 THEN 1
500
1370 S$="03CEFGABCDEFGABCDEF
GAB":IF E=F AND E<>7 AND E<>5 AND E
<>1 THEN PLAY S$ ELSE 1430
1380 IF E=3 THEN S=S+I*10
1390 IF E=4 THEN S=S+I*5
1400 IF E=6 THEN S=S+I*2
1410 IF E=2 THEN S=S+I
1420 GOTO 1510
1430 IF E=G AND E<>7 AND E<>5 AN
D E<>1 THEN PLAY S$:GOTO 1380
1440 IF F=G AND F<>7 AND F<>5 AN
D F<>1 THEN PLAY S$ ELSE 1500
1450 IF F=3 THEN S=S+I*10
1460 IF F=4 THEN S=S+I*5
1470 IF F=6 THEN S=S+I*2
1480 IF F=2 THEN S=S+I
1490 GOTO 1510
1500 PLAY"02BAGFEDC01BAGFEDC"
1510 GOSUB1520:GOTO 850
1520 S=INT(S):IF S<2 THEN S=2
1530 HCLOR15:HLIN(160,176)-(31
9,184),PSET,BF:HCLOR0:HPRINT(21
,22),STR$(S):RETURN
1540 IF X>&H37FF THEN X=X-&H2800
1550 IF Y>&H37FF THEN Y=Y-&H2800
1560 IF Z>&H37FF THEN Z=Z-&H2800
1570 A$=HEX$(X):B$=HEX$(Y):C$=HE
X$(Z):D1=VAL("&H"+LEFT$(A$,2)):D
2=VAL("&H"+RIGHT$(A$,2)):D3=VAL(
"&H"+LEFT$(B$,2)):D4=VAL("&H"+RI
GHT$(B$,2)):D5=VAL("&H"+LEFT$(C$,
2)):D6=VAL("&H"+RIGHT$(C$,2))
1580 POKE&HF06,D1:POKE&HF07,D2:P
OKE&HF0F,D3:POKE&HF10,D4:POKE&HF
18,D5:POKE&HF19,D6
1590 EXEC&HF00:RETURN

```


BIG BASIC

Full Power for your CoCo 3!

(From Danosoft)

Gives up to 92K User Memory in 128K CoCo and 476K in 512K CoCo from BASIC with any mix of program/variables. You can have one BIG program or 58 Separate ones running at once from computer memory in multiple windows! Big Basic also allows you to Disk Chain any size program. Step up to the full potential of your CoCo 3 with Big Basic. Only \$39.95
SUPER BIG BASIC: for Disto 1 MEG Upg. Only \$49.95
BABY BASIC: Tips & Tricks for Basic Programmers. \$8.95

512K Upgrades

Fully assembled, tested and ready to be shipped NOW! Our design allows mounting chips on top to prevent any heating problems. No soldering; Easy instructions for 2 minute installation! Comes with following software (value \$100):

- 512K Ramtest
- 512K Backup Lightning
- 512K Print Spooler
- 512K Ramdisk
- OS9 Level II Ramdisk

The absolute best 512K Upgrade Package Available! 90 day warranty! **New Low Price \$99.95**

OK Upgrade Board (with 512K Ramtest/Ramdisk/Spooler): \$39.95

Upgrades for CoCo 2

64K Upgrade (8 chip) for CoCo I, CoCo II's with Cat # 26-3026/3027/3134/3136: \$29.95

64K Upgrade (2 chip) for 26-3134 A/B CoCo II: \$39.95
 (Free 64K Software Included with 64K Upgrades)

Only
\$99

KEYBOARDS, ETC...

6 Feet Keyboard Extension Cable. Only \$39.95

CoCo 3 Keyboard: \$39.95 w/ Extension Cable: \$69.95

CoCo 2 Keyboard: \$19.95 w/ Extension Cable: \$49.95

(CoCo 3 Keyboard includes free Function Keys Software)

XPort (From Orion Technologies®)

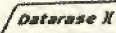
The extended multi-port interface for CoCo 1, 2 or 3.

• 3 Cartridge Slots • 12 Volts powers anything • Use for disk, RS232 Pak much more • Buffered I/O • Perfect replacement for discontinued multi-pak. Intro Special. Only \$74.95

EPROM ...

INTRONICS EPROM PROGRAMMER: Programs 2516 to 27010 & more! Includes software & complete documentation. Latest version. Lowest Price Anywhere. CoCo 1,2,3. Only \$137.95

DATARASE Eprom Eraser: For 24/28 pin Eproms. Erases up to 4 EPROMs at a time. Only \$49.95

Both Eprom Programmer & Eraser: \$179.95 

2764 Eprom: \$8 27128 Eprom: \$9

ROMPAK (w/ Blank PC Board, 27xx Series): \$12.95

BLANK CARTRIDGE (Disk Controller Size): \$10.95

CABLES, Etc.

Magnavox 8505/8515/8CM643 Analog RGB Cable: \$24.95

Serial-to-Parallel Interface: Use your parallel printer at high speed (300-9600 baud) with the CoCo. Comes with all cables.

No software compatibility problems. Only \$44.95

15" Shielded Multipak Extension Cable: \$36.95

Y Cable: Use your disk system with Speech/RS232 Pack, DS69 Digitizer, etc. Only \$27.95

RGB Analog Extender Cable: \$19.95

SONY Monitor Cable: \$29.95

MODEM Cable: 4 pin to DB25. Only \$19.95

2 Position Switcher: Hook 2 devices to serial port. \$29.95

HI-RES Joystick Interface: \$11.99



COMMUNICATIONS EXTRAVAGANZA 2400

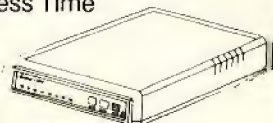
(1) **ZOOM 2400 Modem:** Fully Hayes Compatible 300/1200 /2400 w speaker, Auto Dial/Answer & **Seven Year Warranty!**

(2) **MODEM CABLE** (4pin to DB25; Reg \$19.95)

(3) **Autoterm Software** (Reg \$39.95)

(4) Free Compuserve Offer & Access Time

(5) **UPS 2nd Day Air Shipping**
 Only **\$189.95**



Zoom 2400 Modem: \$149

Avatex 1200e Modem Only : \$85

Communications Extravaganza 1200: Includes Avatex 1200e modem w/ 2 Year Warr., cable, Compuserve Offer, software & 2nd Day Air Shipping. Only **\$129.95**

CHIPS, Etc.

Genuine RS Disk Rom 1.1 (Needed for CoCo 3): \$29.95

ECB Rom 1.1: \$29.95

68B09E Chip: \$14.95

68B21 Chip: \$5.95

GIME Chip for CoCo 3: \$39.95

Genuine RS Multipak PAL Chip (Specify 26-3024 / 26-3124): \$19.95

PAL Switcher: Allows you to switch between CoCo 2 & 3 modes when using the Multipak. You need the OLDER & NEW PAL Chip for the 26-3024 Multipak. Only \$39.95. With NEW PAL Chip Only \$49.95



MICROCOM SOFTWARE 2900 Monroe Ave, Rochester, NY 14618

To Order: All Orders \$75 and above (except Printers, Monitors, Drives, Computers) shipped by **UPS 2nd Day Air** at no extra charge in Continental US. We accept Visa, MC, Amex, Discover, Check, MO & School PO's. Please add \$3.00 S&H (\$10 for Drives) in Continental US; all others add 10% S&H (Min \$5). NYS Residents please add sales tax. Our Australian Agent: Australian Peripheral Development. Ph: 07-341-9061.

Credit Card Toll Free Orderline: 1-800-654-5244 (9AM-8PM 7 Days/week)

Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. Fax: 716-383-0026.



Integers in Order

by Steve Blyn
Contributing Editor

Tailored to meet the needs of intermediate school students, this month's article concerns finding consecutive numbers that add up to a particular sum. This type of problem is one of the many verbal problems students learn to solve in beginning algebra classes.

Over the years, I have used computer programs to present verbal problems, because I think they often prove difficult for students without both strong verbal and arithmetic skills. Computer programs provide a pleasant way to practice these particular problems.

A consecutive integer problem is concerned with an integer, which is defined as any whole number, positive or negative. Zero is considered an integer. Examples of integers are -5, 0 and 128. An even integer is an integer that is twice the amount of another integer. For example, -10 and 246 are even integers. An odd integer is not even; for example, 13 and 201 are odd integers.

Consecutive integers are integers that differ by a value of one. If the first of three consecutive numbers is represented by the variable n , then the next two integers may be represented by $n+1$ and $n+2$. This formula is used in program Line 50.

Both odd and even consecutive integers differ by a value of two. To ensure an even integer, you can double any random number. This is used in program Line 60 ($N=RND(15)*2$). To ensure an odd integer, you first obtain an even integer, then subtract one. This is used in Line 70 ($N=RND(15)*2-1$). Succeeding odd or even integers will then be the previous integer increased by two.

Let's solve a typical example together.

Problem: Find three consecutive even integers with the sum of 60.

Let $2n$ = first integer
Let $2n+2$ = second integer
Let $2n+4$ = third integer

Formula: $2n+2n+2+2n+4=60$
Combine like terms: $6n+6=60$
Solve for n : $6n=54$
Solution: $n=9$

Check:

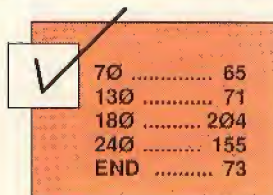
The first integer is $2n$, which equals 18
The second integer is $18+2=20$
The third integer is $20+2=22$
The total of the three is 60.

Summary

The program generates random examples, and the student is required to solve only for the first integer of the answer in each example. The other two integers and the sum are worked out on the computer screen for the student. This enables the student to see the checkup as well as the example.

Each set has ten practice problems. The program displays a score so the student can check his progress. After each set, the student may end the program or begin again. Please feel free to make modifications to the program. Altering the random numbers used on lines 50 through 70 changes the difficulty level of the program. □

16K Extended



70	.....	65
130	.....	71
180	.....	204
240	.....	155
END	.....	73

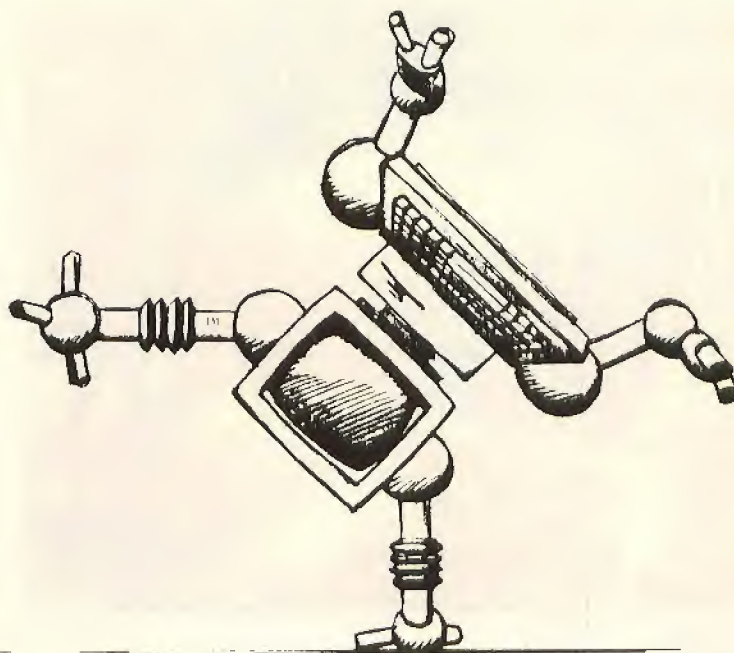
The Listing: CONSEC

```
10 REM"CONSECUTIVE NUMBER PROBLEMS"
20 REM"STEVE BLYN, COMPUTER ISLAND, STATEN ISLAND, NY, 1990"
30 X=RND(-TIMER):CLS:PLAY"03L20GEC":CT=CT+1
40 R=RND(3):Z=Z+1:IF CT=11 THEN 250
50 IF R=1 THEN N=RND(20)+10:C=N+N+1+N+2
60 IF R=2 THEN N=RND(15)*2:C=N+N+2+N+4
70 IF R=3 THEN N=RND(15)*2-1:C=N+N+2+N+4
80 IF R=1 THEN B$="CONSECUTIVE" ELSE IF R=2 THEN B$="CONSECUTIVE EVEN" ELSE B$="CONSECUTIVE ODD"
90 PRINT@2,"CONSECUTIVE NUMBER PROBLEMS":
100 PRINT@32,STRING$(32,224):
110 PRINT@64,"#";Z:"FIND THREE "
:B$
120 PRINT@96,"NUMBERS WHOSE SUM
```

```
IS ";C
130 PRINT@160,"THE FIRST NUMBER IS ";:INPUT A1
140 IF A1=N THEN PLAY"04L50CDEFGG":SC=SC+1:PRINT@200,"CORRECT":
150 IF A1<>N THEN SOUND6,3:SOUND 10,3:PRINT@200,"SORRY, IT'S ";
N:
160 PRINT@227,"let's check now":
:GOSUB 240
170 PRINT@256,"THE SECOND NUMBER IS ";:IF R=1 THEN A2=N+1 ELSE A2=N+2
180 PRINTA2;:GOSUB 240:PRINT@320,"THE THIRD NUMBER IS ";:IF R=1 THEN A3=N+2 ELSE A3=N+4
190 PRINTA3;:GOSUB 240:PRINT@373,"---";
200 PRINT@394,"THE TOTAL =";C
210 PRINT@416,STRING$(32,224);:PRINT@452,"PRESS ENTER TO CONTINUE":
220 EN$=INKEY$
230 IF EN$=CHR$(13) THEN 30 ELSE 220
240 FOR T=1 TO 1000:NEXT T:PLAY"03L20GC":RETURN
250 CLS:PRINT@6,"YOUR SCORE WAS":SC*10;%"
260 PRINT@96,"PRESS e TO END OR a FOR ANOTHER":
270 EN$=INKEY$
280 IF EN$="E" THEN END ELSE IF EN$="A" THEN RUN ELSE 270
```

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees, and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

We Can Make Your CoCo Do Things You Just Wouldn't Believe



Stupendous Software at Silly Prices! There's no reason to wait.

System Requirements

Max-10 and CoCo Max III Require: any CoCo 3; 1 or more disk drives; joystick or mouse; Radio Shack Hi Resolution joystick interface; a video or RGB monitor or a TV.

Max-10...~~\$79.95~~ \$39.95

Max-10 is the ultimate word processor. It allows on screen mixing of graphics and text, large headlines, multiple columns and full page preview with graphics. *Rainbow* stated "Max-10 takes a back seat to none". Without a doubt, Max-10 will add excitement to your word processing, and that's no small task!

PRINTERS SUPPORTED: EPSON FX, MX, RX, LX & COMPATIBLES; DMP 105, 106, 130; CGP220 (B&W); OKI 182, 92, 192; STAR NX-10, NX 1000.

Max-10 Add-ons

- **Max-10 Fonts.** 36 super fonts on 2 disks,~~\$29.95~~ \$14.95
Max-10 and CoCo Max Fonts aren't interchangeable.
- **Spell Checker** 35,000 word dictionary for online spell checking and dictionary lookup. Perfect seamless integration with Max-10.....~~\$29.95~~ \$14.95

CoCo Max III...~~\$79.95~~ \$49.95

Whether you doodle for fun or do graphics for a living, **CoCo Max** will amaze you. It's a promise. *Rainbow* called it "the ultimate program." **Its major features include:** Huge picture area (2 full hires 320x192 screens). Large editing window. **Zoom** mode for detail work. 28 point and click drawing tools. Shrink and stretch. **Rotation** at any angle (1.5° steps). 512K memory support (all features work with 128K too). Undo (Oops) feature to fix mistakes. **Animation.** Special effects. Color sequencing (8 colors, variable speed). 13 fonts (more available). Each font has 8 sizes and 5 styles for thousands of possible combinations. Translate program to convert most types of pictures. **CoCo Show** "slide show" program. Miniload program to help use pictures with your software. Color editing of patterns. Prints in single or double size. Select 16 of 64 available colors, all 64 colors are shown at once for easy selection. Pull-down menus. **40 paint brush** shapes. 2 color lettering. Spray can. Amazing "flowbrush". RGB and composite monitor support. Colors print in 5 shades of gray.

PRINTERS SUPPORTED: EPSON RX, FX, MX, LX AND COMPATIBLES; STAR/GEMINI NX-10, NX-1000; DMP 100, 105, 106, 110, 120, 130, 200; OKI 82A, 182, 192; CGP-220 (B&W)

Color Drivers. See below.

CoCo Max 3 and Max 10

Get both incredible programs at a stunning price.....~~\$149.95~~ \$59.95

CoCo Max 3 Addons

- **Max Fonts set A, Max Fonts set B.** Each set has two disks and over 40 fonts.....~~\$29.95~~ \$14.95
- Both sets (95 fonts).....~~\$49.95~~
- **Max Edit** Create new fonts or edit existing ones.....~~\$19.95~~ \$14.95
- **Color Printer** drivers NX-1000 Rainbow, CGP-220, and Okimate 20.....~~\$19.95~~ \$14.95

Digitizer

Digitize any picture from any video source (VCR, camera...) for use with CoCo Max 3 or Max-10. **DS-69** Requires Multipak. 2 pix per second~~\$99.95~~

A-Bus

Data Acquisition and Control boards. Call Alpha Products at number below.

Call or Write Now

(203) 656-1806
Weekdays 9-5 Eastern Time

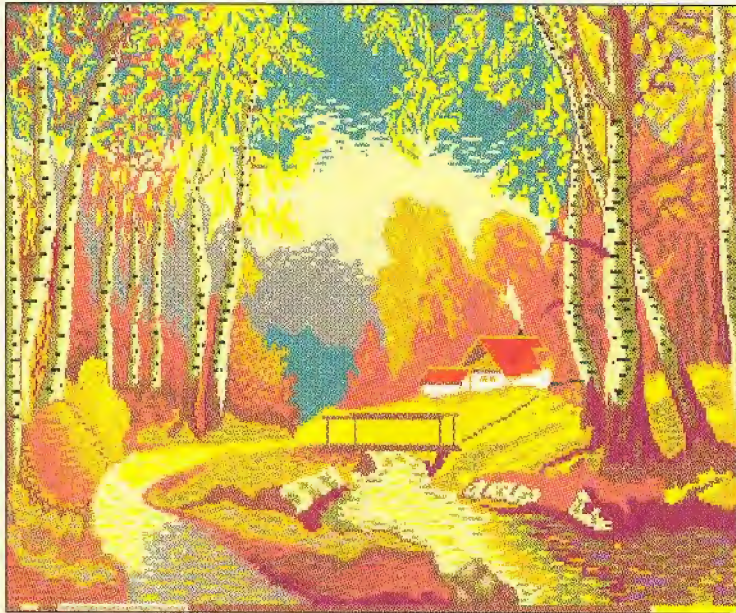
242 West Avenue,
Darien CT 06820

Ordering Information: We accept Visa, Mastercard, Checks, M.O. C.O.D. is \$4 extra. Purchase orders subject to credit approval. Connecticut residents add 8% sales tax. Shipping: \$4 per order (usually UPS ground). Canada: \$6 per order (Airmail). Outside USA & Canada: Add 10% of order total. UPS 2nd Day Air: \$6 extra. Next Day service available.

COLORWARE

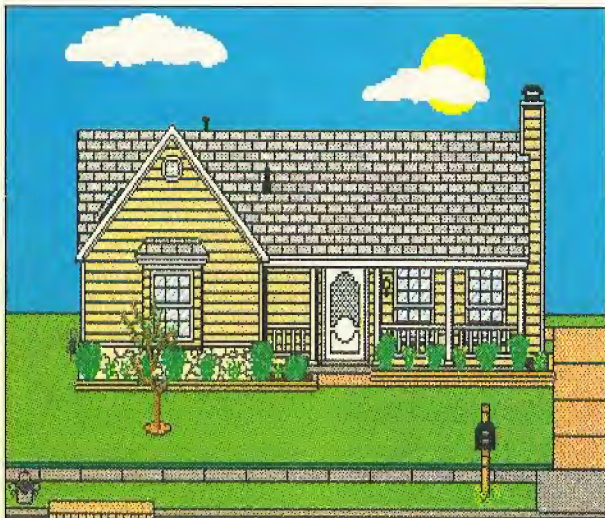
CoCo Gallery

1st Place



Autumn
Waddy Juraszek

Waddy is a scenery maker at the Australian Opera Company, and ever since buying *CoCo Max III* he has wanted to enter this competition. This countryside cottage scene was drawn on plain paper, then graph paper, and finally onto the screen. Waddy lives in Liverpool, New South Wales.



3rd Place

Our House
Logan Ward

Logan, who resides in Memphis, Tennessee, created this view of his house using *Color Max 3*. You may be familiar with the Maxwell Mouse cartoons Logan has contributed to issues of the RAINBOW.

SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also please include a few facts about yourself.

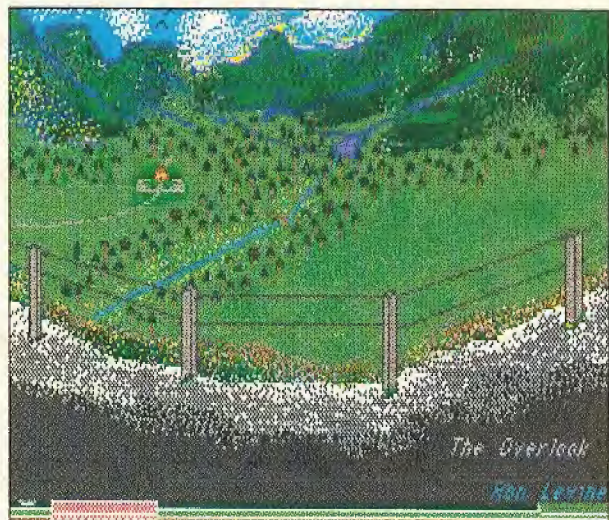
Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is not an original work.

We will award one first prize of \$25, one second prize of \$15 and one third prize of \$10.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

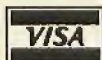
—Tony Olive, Curator

2nd Place



The Overlook
Ron Levine

Ron is a communications technician in the Atlanta area and has been a devoted CoCo user since the first grey CoCo. His hobbies include playing the guitar, cooking and Adventure games. He is married and has three children who are all CoConuts. Ron lives in Kennesaw, Georgia. The picture was designed using *CoCo Max III*.



◀◀◀ GIMMESOFT ▶▶▶



A new generation of Color Computer products

V-Term Terminal

- Vax, Unix, Mainframe, and BBS systems
- Vt-100, Vt-52, Vidtex & Ascii emulations
- Serial port to 2400, RS-232 to 19,200 baud
- XModem, XModem-CRC, YModem, ASCII
- 15 entry autodial, 10 programmable macros
- Disk (128k or 512k CoCo 3 only) \$39.95

Telepak II RS-232

A Truly Compatible RS-232 Interface!
It comes with a 3 foot DB25 cable, gold edge contacts, and low power drain (5v) components.
Telepak II & Manual \$49.95



Xport NOW IN STOCK!

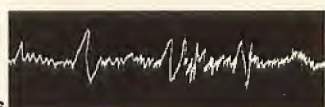
The replacement for the Multi-Pak Interface is here! Xport is just that, an extended port interface that is buffered (unlike a Y-Cable), has 3 ports (2 switchable), and has it's own 12v supply for those devices that require it. Xport is made with the same quality & workmanship as Telepak II

Reg. \$79.95 Introductory price \$74.95

Turbo 512k Ram

- Fully assembled and tested board
- Premium 120ns 256x1 memory chips
- Easy to follow instructions
- Fast and easy installation
- Complete with 512k software
- RamDisk, RamTest, & Print Spooler

512k board w/software ... \$89.95
0k board w/software ... \$34.95



Studio Works Digital Audio Sampler



Studio Works Pro

NEW! CD Quality samples up to 35k by 8 bits! Supports 1 MEG systems! Optional MIDI, MIC, and DC inputs!
Disk Only - \$38.95 With Cable - \$53.95
With CD Quality ADC 8 bit Rom Pak - \$94.95

Soundtrax

The perfect partner for Studio Works! Soundtrax is a sound sequencing system that imports digitized audio samples & provides total control.
For CoCo 3, mouse/joystk, & disk \$34.95

Zenix



Games

An extremely fast and exciting arcade style game with 32 levels of play! You must *Blast* your way through a race of spacefaring insectoids and ultimately reach & destroy their planet, *ZENIX*! For CoCo 3, joystk & disk ... \$29.95

Kyum-Gai: to be Ninja

For CoCo 3, joystk, & disk ... \$29.95

Warrior King

For CoCo 3, joystk, & disk ... \$29.95



Zenix

Those Darn Marbles

This NEW 512k only, arcade style, 3D marble game features extra smooth, hardware screen scrolling, great sound effects, and almost 1 meg of graphics to produce incredible CoCo 3 action! 512k CoCo 3, joystk, & disk .. \$31.95

Sinistaar 512k

For CoCo 3, joystk, & disk ... \$34.95

Paladin's Legacy

CoCo 1,2,3, joystk, & disk ... \$24.95

CoCo 3 \$29.95



Suprfile III



MS/Dos \$39.95

Suprfile III is a powerful, user friendly, easy to use, multi-purpose database! It can be used for Mailing lists, Labels, a Checkbook Manager, Shopping lists, Personal items inventory, Audio/Video lists and on and on! Features: Add, Delete, Search, Sort, Print Labels & Reports.

Fkeys III (CoCo 1,2, 3) \$19.95

Sixdrive (CoCo 1,2, 3) \$16.95



Locking Plates (CoCo 2 or 3) \$7.95

Multi-Label III (CoCo 3 only) \$16.95

Toll Free

1-800-441-GIME

Order Line

Free 2ND AIR from Midwest to California
Orders: 9am to 9pm Eastern time
On-line orders: Delphi's CoCo Sig
Inquiries & technical assistance: 7pm to 9pm:

GIMMESOFT
P.O. Box 421
Perry Hall, MD 21128
301-256-7558

Add \$3.00 for shipping and handling
Add \$3.00 for COD (USA only)
MD residents add 5% sales tax
VISA/MC/Check/Money Order/COD

Learning Letter Sequence

by Fred B. Scerbo
Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.

Receiving reader mail is one of the most satisfying things about writing this column. In recent years, many readers have donated CoCos and disk drives to our special needs classes. That request was made almost two years ago and I still get calls or letters from people who say they have an old CoCo and a disk drive they'd like to donate. The generosity of CoCo users is sometimes heartwarming.

I received a letter from Jana Wallace of Jackson, Michigan, the last paragraph of which I will share with you. It reads: "Thanks for your interest in children! I bought my CoCo to counter their interest in Nintendo. They always seem to fight when they play Nintendo, but when at the computer they help each other. I hope to get them interested in their own programming."

That's the whole purpose of "The Wishing Well." With our CoCo and the right software you can make your family's time in front of the tube educational.

Recently I received a request for a program to drill students in naming the correct letter between two others, such as: What comes between E and G? These are important skills, however, this is not a practical way to quiz a student who needs to learn these skills. Obviously you cannot expect a student who lacks the ability to put letters in alphabetical order to be able to read a sentence that asks that question.

A logical way to present this material is to use the structure that

most of our recent programs use: the opposites grids used the *Music* series. This is also the structure used in the program *Letters*.

Unfortunately, the graphics used for *Letters* are a little too large for this purpose. By rewriting and changing the S value in the draw statements from S4 to S3, I came up with some totally new graphics data lines using an onscreen editor to merge data lines. The program is changed in spots, but still works the same way. In other words, it instructs in the Review mode rather than just quizzing students. This is the true characteristic of educational software — it instructs.

Using the Program

This program runs easily, like the other recent educational programs I have listed. When you run *BETWEEN*, you see a menu. Section A lets you review, and B and C give you two different quiz versions to try.

The review section works by showing each letter of the alphabet and the letters that surround it. You advance through the screens by pressing ENTER.

When you use the quiz section, the upper-right corner shows a reverse-image choice, such as a letter of the alphabet. The next three boxes show the possible letters to surround it. Pressing the space bar moves you through the choices. Pressing ENTER records your answer. If you are correct, the correct answer appears. If you are incorrect, you can try again until you get it right.

Pressing @ lets you check your score, and pressing C to continue lets you pick up where you left off.

As I mentioned earlier, this method allows you to use the program with youngsters not yet able to read. Even the youngest CoCo user can manipulate the space bar and ENTER key. Thus we have an excellent tool for introducing the very young to the world of computers.

The Future

Notice this program is titled *In-Between* Volume 1. A follow-up program is logical. There is a real need for teaching these skills, and these programs are capable of performing the task well.

Please keep your comments and suggestions coming in. It really helps to know what your needs are so I can work to help fill them.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

32K Extended

✓	20	60
	35	149
	55	252
	75	130
	100	100
	130	110
	155	96
	195	158
	240	214
	280	127
	310	109
	340	65
	365	219
	383	83
	400	37
	420	188
	440	33
	460	178
	480	173
	500	165
	520	121
	540	186
	555	223
	575	119
	595	73
	615	8
	630	251
	655	25
	END	177

The Listing: BETWEEN

```

1 REM*****
2 REM*      IN-BETWEEN VOL.1      *
3 REM*      COPYRIGHT (C) 1990    *
4 REM*      BY FRED B. SCERBO     *
5 REM*      60 HARDING AVENUE     *
6 REM*      NORTH ADAMS, MA 01247 *
7 REM*****
10 CLEAR3000
15 CLS0:PRINTSTRING$(32,220);STR

```

DISK LABEL

Season's Greetings From Zebra Systems
MR. & MRS. COCO USER
110 MAIN STREET
SOMEWHERE, US 12345

STANDARD ADDRESS LABEL

ACCOUNTS PAYABLE

FILE FOLDER LABEL

LABEL DESIGNER SAMPLE COLLECTION #1
COPYRIGHT (C) 1989
ZEBRA SYSTEMS, INC.
ALL RIGHTS RESERVED
VERSION 1.0
SERIAL #1004

DISK LABEL

BEETHOVEN SYMPHONY NO. 5
NEW YORK PHILHARMONIC - JUBIN MEYER
COLUMBIA RECORDS 412456

CASSETTE LABEL

COLLEGE BAKE SHOP
200 Henry Street
Queens, NY 11234
(718) 123-4557

ROLODEX CARD

The Label Designer is simply the most powerful, flexible, and easiest-to-use label program ever written for the CoCo.

- complete graphics user interface
- serial numbering
- mail-merge
- automatic disk-directories

Label Designer disk & 64 page manual\$29.95

Assortment of different size and color labels.....\$5.00

"I made a number of signs, cards and banners with CoCo Graphics Designer Plus and was thrilled with them all."

--Jim Issel
May 89 Rainbow



The CoCo Graphics Designer Plus, produces beautiful greeting cards, banners, and signs.

The CGDP features an easy-to-use point and click graphical interface with windows, scroll bars, radio buttons, and joystick or mouse control. Text can be used in up to 4 sizes and 16 fonts per page. Picture, Font, and Border collections are included. Signs and cards can be previewed on screen. ... Rave review in May 89 Rainbow (pages 110 - 113).

CGDP Disk & 64 page manual.....\$29.95

OPTIONAL PICTURE, FONT, AND BORDER DISKS: \$14.95 EACH.

Picture Disk #2 4 sets of 30 pictures ea., Sports, America, Party, Office, Total 120 pictures.
Picture Disk #3 4 sets of 30 pictures ea. Animals, Nature, Religion, Travel, Total 120 pictures.
Picture Disk #4 120 Holiday Pictures: Christmas, Chanukah, Thanksgiving, New Year's, Easter, Halloween, etc.
Font Disk A 10 Fonts: Western, Stencil, Banner, Shadow, Variety, Type, Stripes, Digital, Bold3, Object
Font Disk B 10 Fonts: Arcade, Circle, Alien, Cube, Baroque, Deco, Block, Gray, Computer, Script
Border Disk #1 Contains 176 High resolution borders, great variety from simple to ornate. (The border disk is for use with the CGDP, but not with the Label Designer).

Above programs require a CoCo II 64K or CoCo III, disk drive, RSDOS, joystick or mouse. Printers supported include: Epson RX/FX/LX, Gemini 10X, SG10, NX10, NX1000, DMP105/106/110/120/130/132/133/200/400, Panasonic KXP1080 / 90 / 91/92, Prowriter, C.Itoh 8510, Okidata 92/93/182/183 & more.

Ordering Instructions: All orders add \$3.00 Shipping & Handling, UPS COD \$3.50 additional. VISA/MC Accepted. PA residents add sales tax. Hours 9-5:45 M-F.

≡ ZEBRA SYSTEMS, INC. ≡
121 S. Burrowes Street
State College, PA 16801
(814) 237-2652


```

ING$(32,204)::FORI=1TO160:READA:
PRINTCHR$(A+128)::NEXT
20 PRINTSTRING$(32,195)::STRING$(
32,211);
25 DATA93,88,93,80,93,88,16,45,4
4,44,34,45,44,45,37,44,45,44,45,
37,40,,45,36,46,45,36,46,45,37,3
2,37
30 DATA85,,85,89,85,,,37,,,42,37
,,33,36,,37,,36,37,,,37,,42,33,,
42,33,37,41,37
35 DATA85,,85,80,93,,28,37,44,44
,34,37,44,45,,,37,,,37,,34,37,,4
6,45,,46,45,37,32,45
40 DATA85,,85,,85,,,37,,,42,37,,
32,,,37,,,37,,42,37,,42,32,,42,,
37,,37
45 DATA87,82,87,82,87,82,,39,35,
34,40,39,35,39,,,39,34,,37,35,43
,39,33,43,39,33,43,39,37,,37
50 PRINT@358," AN INTRODUCTION T
O "":PRINT@390," SEQUENCE IN LE
TTERS "":
55 PRINT@422," BY FRED B. SCERBO
"::PRINT@454," COPYRIGHT (C)
1990 "":
60 X$=INKEY$:IFX$<>CHR$(13)THEN6
0
65 DIM P$(26,3),A$(6),B$(26),C$(
26),A(26),N(26),B(4),C(4),D(4),E
(4),F(4),AO(26)
70 FORI=1TO3:READ C(I),D(I),E(I)
,F(I):NEXT:FORI=1TO6:READA$(I):N
EXT:FORI=1TO26:READP$(I,1),P$(I,
2):NEXT
75 COLOR1,0
80 CLS:PRINT:PRINTSTRING$(32,"="
)::PRINT@102,"AN INTRODUCTION TO
":PRINT@134,"SEQUENCE IN LETTERS
":PRINT@199,"A) REVIEW LETTERS":
PRINT@263,"B) QUIZ SPACES":PRINT
@327,"C) QUIZ LETTERS"
85 PRINT@388,"<<<SELECT YOUR CHO
ICE>>>"
90 PRINT:PRINTSTRING$(32,"="):
95 X$=INKEY$:X=RND(-TIMER):IFX$=
"A"THEN350ELSEIFX$="B"THEN100ELS
EIFX$="C"THEN640ELSE95
100 CLS0:PMODE0,1:PCLS1
105 LINE(0,0)-(254,170),PRESET,B
110 LINE(6,4)-(122,82),PRESET,BF
115 LINE(128,4)-(248,82),PRESET,
B
120 LINE(6,86)-(122,164),PRESET,
B
125 LINE(128,86)-(248,164),PRESE
T,B
130 DRAW"BM26,188C0NU10R10NU10BR
6R10U6L10U4R10BR6NR10D4NR10D6R10
BR12BU6NE4D2F4BR6R10U6L10U4R10BR
6ND10R10D4NL10BR6NR10D6U10R10D10
BR6NR10U10R10BR6NR10D4NR10D6R10B
R10U10NL4R10D4NL10D6NL14BR6U10R1
0D4NL10D6BR6U10R10D4L10R4F6BR6E4
U2H4"
135 DATA130,6,246,80,6,86,120,16
2,130,86,246,162
140 PAINT(2,2),0,0:PCOPY1TO3
145 PMODE0,4:PCLS1
150 LINE(0,0)-(254,170),PRESET,B
F
155 LINE(8,6)-(120,80),PSET,BF
160 PCOPY4TO2:PMODE0,1:SCREEN1,1
165 DATA"S3BM2,8C1","S3BM130,8C0
","S3BM2,90C0","S3BM130,90C0","S
3BM2,48C0","S3BM130,48C0"
170 FORI=1TO26

```

```

175 A(I)=RND(26):IFN(A(I))=1THEN
175
180 N(A(I))=1:NEXTI:FORY=1TO26:C
OLOR1,0
185 FORI=2TO4
190 B(I)=RND(3)+1:IFN(B(I))=0THE
N190
195 N(B(I))=0:NEXTI:FORI=1TO4:N(
I)=1:NEXT
200 B=RND(26):IFB=A((Y))THEN200
205 C=RND(26):IFC=B OR C=A((Y))T
HEN205
210 DRAW A$(1):DRAWP$(A(Y),1)
215 DRAW A$(B(2)):DRAWP$(B,2):DR
AWP$(B,3)
220 DRAW A$(B(3)):DRAWP$(C,2):DR
AWP$(C,3)
225 DRAW A$(B(4)):DRAWP$(A(Y),2)
:DRAWP$(A(Y),3)
230 COLOR1,0
235 Z=0
240 PMODE0,4
245 DRAW A$(1)+"C0":DRAWP$(A(Y),
1)
250 DRAW A$(B(2))+"C1":DRAWP$(B,
2):DRAWP$(B,3)
255 DRAW A$(B(3))+"C1":DRAWP$(C,
2):DRAWP$(C,3)
260 DRAW A$(B(4))+"C1":DRAWP$(A(
Y),2):DRAWP$(A(Y),3)
265 PMODE0,1:SCREEN1,1
270 LINE(8,6)-(120,80),PSET,B
275 X$=INKEY$:IFX$=" "THEN285ELS
EIFX$="0"THEN650
280 COLOR1,0:LINE(8,6)-(120,80),
PRESET,B:GOTO270
285 Z=Z+1:IFZ=4THENZ=1
290 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PSET,B
295 X$=INKEY$:IFX$=" "THEN285ELS
EIFX$=CHR$(13)THEN305ELSEIFX$="0
"THEN650
300 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PRESET,B:GOTO290
305 IFZ=1=4)THEN315
310 NW=NW+1:FORK=1TO5:PMODE0,4:S
CREEN1,1:SOUND10,3:PMODE0,1:SCRE
EN1,1:SOUND1,3:NEXTK:GOTO290
315 NC=NC+1:PMODE0,4:PCLS1:LINE(
0,40)-(256,126),PRESET,B:LINE(6,
44)-(124,122),PRESET,B:LINE(130,
44)-(248,122),PRESET,B:PAINT(2,4
2),0,0
320 DRAW A$(5):DRAWP$(A(Y),1)
325 DRAW A$(6):DRAWP$(A(Y),2):DR
AWP$(A(Y),3)
330 SCREEN1,1
335 X$=INKEY$:IFX$<>CHR$(13)THEN
335
340 PMODE0,1
345 PCOPY3TO1:SCREEN1,1:PCOPY2TO
4:NEXTY:GOTO650
350 PMODE0,2:PCLS1:SCREEN1,1:LIN
E(0,40)-(256,126),PRESET,B:LINE(
6,44)-(124,122),PRESET,B:LINE(13
0,44)-(248,122),PRESET,B:PAINT(2
,42),0,0
355 FORI=1TO26:DRAW A$(5):DRAWP$
(I,1)
360 DRAW A$(6):DRAWP$(I,2):DRAW
P$(I,3)
365 X$=INKEY$:IFX$<>CHR$(13)THEN
365
370 COLOR1,0:LINE(8,46)-(122,120
),PSET,BF:LINE(132,46)-(246,120)
,PSET,BF:NEXTI
375 RUN

```

```

380 DATA"BD64BR54M+20,-40R8M+20,
+40L10M-8,-16L12M-8,+16NL10BM+11
,-22UM+3,-6RM+3,+6DL6
385 DATA"BD64BR34R2BR8R2BR8R2BR8
R2BR8U6R4U28L4U6R34F4D12G4F4D12G
4NL34BH6NL16E2U6H4L14ND10BU8R14E
4U4H2L16D10"
390 DATA"BD64BR56U6R4U28L4U6R34F
4D12G4F4D12G4NL34BH6NL16E2U6H4L1
4ND10BU8R14E4U4H2L16D10"
395 DATA"BD64BR16M+20,-40R8M+20,
+40L10M-8,-16L12M-8,+16NL10BM+11
,-22UM+3,-6RM+3,+6DL6BD22BR34R2B
R8R2BR8R2BR8R2BR8H4U30E6R28F6D6L
8H4L14G4D18F4R14E4R8D6G6L28"
400 DATA"BD64BR60H4U30E6R28F6D6L
8H4L14G4D18F4R14E4R8D6G6L28"
405 DATA"BD64BR20H4U30E6R28F6D6L
4D12G4F4D12G4NL34BH6NL16E2U6H4L1
4ND10BU8R14E4U4H2L16D10BD24BR34R
2BR8R4BR8R2BR8R4BU2U6R4U28L4U6R3
4F4D32G4NL34BH6NL16E2U4H2L16D26
"
410 DATA"BD64BR58U6R4U28L4U6R34F
4D32G4NL34BH6NL16E2U4H2L16D26"
415 DATA"BD64BR20H4U30E6R28F6D6L
8H4L14G4D18F4R14E4R8D6G6L28BR8R
2BR8R4BR8R2BR8R4BR8U40R40D8L30D8
R20D8L20D8R30D8L40"
420 DATA"BD64BR20H4U30E6R28F6D6L
0D8L20D8R30D8L40"
425 DATA"BD64BR20U6R4U28L4U6R34F
4D32G4NL34BH6NL16E2U4H2L16D26BD
6BR30R4BR8R2BR8R4BR8U40R40D8L30D
8R20D8L20D8L20D16L10"
430 DATA"BD64BR58U40R40D8L30D8R2
0D8L20D16L10"
435 DATA"BD64BR18U40R40D8L30D8R2
0D8L20D8R30D8NL40BR8R2BR8R4BR8R2
BR8R4BR8H6U2E6R28F6D6L8H4L14G4D
16F4R14E4U2L10U8R18D16G6L28"
440 DATA"BD64BR62H6U28E6R28F6D6L
8H4L14G4D16F4R14E4U2L10U8R18D16G
6L28"
445 DATA"BD64BR28U40R40D8L30D8R2
0D8L20D16NL10BR20R2BR8R2BR8R4BR8
R2BR8U40R8D16R20U16R8D40L8U16L20
D16L8"
450 DATA"BD64BR60U40R8D16R20U16R
8D40L8U16L20D16L8"
455 DATA"BD64BR30H6U28E6R28F6D6L
8H4L14G4D16F4R14E4U2L10U8R18D16G
6NL28BR8R2BR8R4BR8R2BR8R4BR8U6R6
U28L6U6R20D6L6D28R6D6L20"
460 DATA"BD64BR70U6R6U28L6U6R20D
6L6D28R6D6L20"
465 DATA"BD64BR20U40R8D16R20U16R
8D40L8U16L20D16L8BR46R2BR8R4BR8R
2BR8H4U12R8D4F4R8E4U22L12U6R34D6
L12D28G6L22"
470 DATA"BD64BR60H4U12R8D4F4R8E4
U22L12U6R34D6L12D28G6L22"
475 DATA"BD64BR30U6R6U28L6U6R20D
6L6D28R6D6NL20BR8R2BR8R4BR8R2BR8
U40R10D16E16R12G20F20L12H16D16L1
0"
480 DATA"BD66BR58U40R10D16E16R14
G20F14R2F6L12H16D16L10"
485 DATA"BD64BR26H4U12R8D4F4R8E4
U22L12U6R34D6L12D28G6NL22BR14R2B
R8R4BR8R2BR8R4BR8U40R10D32R2D8L
30"
490 DATA"BD64BR62U40R10D32R2D8L
30"
495 DATA"BD66BR16U40R10D16E16R14
G20F14R2F6L12H16D16L10BR48R2BR8R
4BR8R2BR8U40R10F14E14R10D40L10U2

```


8G14H14D28L10"
 500 DATA"BD64BR58U40R10F14E14R10
 D40L10U28G14H14D28L10"
 505 DATA"BD64BR16U40R10D32R22D8N
 L30BR8R2BR8R4BR8R2BR10U40R16M+20
 ,+30U30R10D40L16M-20,-30D30L10"
 510 DATA"BD64BR58U40R16M+20,+30U
 30R10D40L16M-20,-30D30L10"
 515 DATA"BD64BR20U40R10F14E14R10
 D40L10U28G14H14D28L10BR54R2BR8R4
 BR8R2BR8H4U30E6R30F6D6ND16BL10H4
 L14G4D16F4R14E4NU14BR10D8G6L30"
 520 DATA "BD60BR62NF4U30E6R30F6D
 6ND16BL10H4L14G4D16F4R14E4NU14BR
 10D8G6L30"
 525 DATA"BD64BR16U40R16M+20,+30U
 30R10D40L16M-20,-30D30L10BR50BR8
 R2BR8R4BR8R2BR12U40R30F4D16G4L20
 D16NL10BU24U8R12F2D6G2L12"
 530 DATA"BD64BR68U40R30F4D16G4L2
 0D16NL10BU24U8R12F2D6G2L12"
 535 DATA "BD60BR18NF4U30E6R30F6D
 6ND16BL10H4L14G4D16F4R14E4NU14BR
 10D8G6NL30BR14R2BR8R4BR8R2BR14BU
 2H6U28E6R30F6D6ND14BL10H4L14G4D1
 6F4R8H6R6F6E4NU14BR10D6G8F6L6H6L
 22"
 540 DATA"BD64BR66H6U28E6R30F6D6N
 D14BL10H4L14G4D16F4R8H6R6F6E4NU1
 4BR10D6G8F6L6H6L22"
 545 DATA"BD64BR18U40R30F4D16G4L2
 0D16NL10BU24U8R12F2D6G2NL12BD26B
 R8R2BR8R4BR8R2BR8R4BR14U40R30F4D
 16G4BL20D16NL10BU24U8R12F2D6G2L1
 2BD8F16R12H16R6"
 550 DATA"BD64BR60U40R30F4D16G4BL
 20D16NL10BU24U8R12F2D6G2L12BD8F1

6R12H16R6"
 555 DATA"BD64BR20H6U28E6R30F6D6N
 D14BL10H4L14G4D16F4R8H6R6F6E4NU1
 4BR10D6G8F6L6H6NL22BR22R2BR8R4BR
 8R2BR8U8R30U8L30U24R38D8L28D8R28
 D24L38"
 560 DATA"BD64BR60U8R30U8L30U24R3
 8D8L28D8R28D24L38"
 565 DATA"BD64BR20U40R30F4D16G4BL
 20D16NL10BU24U8R12F2D6G2L12BD8F1
 6R12H16NR6F16BR8R2BR8R4BR8R2BR8U
 6R6U26L18U8R44D8L18D26R6D6L20"
 570 DATA"BD64BR60U8R6U26L18U8R44
 D8L18D26R6D6L20"
 575 DATA"BD64BR20U8R30U8L30U24R3
 8D8L28D8R28D24NL38BR8R2BR8R4BR8R
 2BR8U40R10D32R20U32R10D40L38"
 580 DATA"BD64BR58U40R10D32R20U32
 R10D40NL38"
 585 DATA"BD64BR28U6R6U26L18U8R44
 D8L18D26R6D6NL20BR18R2BR8R4BR8R2
 BR14M-20,-40R12M+16,+32M+16,-32R
 12M-20,+40L14"
 590 DATA"BD64BR72M-20,-40R12M+16
 ,+32M+16,-32R12M-20,+40L14"
 595 DATA"BD64BR18U40R10D32R20U32
 R10D40NL38BR10R2BR8R4BR8R2BR8M-1
 0,-40R10M+8,+32M+8,-32R16M+8,+32
 M+8,-32R10M-10,+40L16M-8,-32M-8,
 +32L16"
 600 DATA"BD64BR58M-10,-40R10M+8,
 +32M+8,-32R16M+8,+32M+8,-32R10M-
 10,+40L16M-8,-32M-8,+32L16"
 605 DATA"BD64BR28M-20,-40R12M+16
 ,+32M+16,-32R12M-20,+40NL14BR8R2
 BR8R4BR8R2BR10E20H20R12F16E16R12
 G20F20L12H16G16L12"

610 DATA"BD64BR56E20H20R12F16E16
 R12G20F20L12H16G16L12"
 615 DATA"BD64BR28M-10,-40R10M+8,
 +32M+8,-32R16M+8,+32M+8,-32R10M-
 10,+40L16M-8,-32M-8,+32NL16BR38R
 2BR8R4BR8R2BR8U16M-14,-24R12M+8,
 +14M+8,-14R12M-14,+24D16L12"
 620 DATA"BD64BR72U16M-14,-24R12M
 +8,+14M+8,-14R12M-14,+24D16L12"
 625 DATA"BD64BR16E20H20R12F16E16
 R12G20F20L12H16G16L12BR46R2BR8R
 4BR8R2BR8U8E24L24U8R36D8G24R24D8
 L36"
 630 DATA"BD64BR60U8E24L24U8R36D8
 G24R24D8L36"
 635 DATA"BD64BR30U16M-14,-24R12M
 +8,+14M+8,-14R12M-14,+24D16NL12B
 R20R2BR8R4BR8R2BR8R4BR8R2BR8"
 640 CLS:FORI=1TO26:TEM\$=P\$(I,1)
 :P\$(I,1)=P\$(I,2):P\$(I,2)=TEM\$:NE
 XT
 645 GOTO100
 650 CLS:PRINT@101,"YOU TRIED"NC+
 NW"TIMES &":PRINT@165,"ANSWERED"
 NC"CORRECTLY"
 655 PRINT@229,"WHILE DOING"NW"WR
 ONG."
 660 NQ=NC+NW:IF NQ=0THEN NQ=1
 665 MS=INT(NC/NQ*100)
 670 PRINT@293,"YOUR SCORE IS"MS"
 %."
 675 PRINT@357,"ANOTHER TRY (Y/N/
 C) ?":
 680 X\$=INKEY\$:IFX\$="Y"THEN RUN
 685 IFX\$="N"THENCLS:END
 690 IFX\$="C"THEN265
 695 GOTO680

21st. Century Software

For Orders & Technical Assistance...

(407) 348-0848

Utili-Comm...CoCo3 terminal, astounding!

Everything in 3D shadowed pop up windows, using 16 colors! Supports Xmodem BATCH, Ymodem BATCH and regular Xmodem & Ymodem...CRC or Checksum with all. Also ASCII send/receive. Fully emulates ANSI (full color), vt-52, vt-100, vt-200, vt-220, INTEL PC, CONCEPT-100, TTY and VIDEOTEX. Has Tele-Clone protocol, clones chosen tracks from disk over the phone to host...fast!...works with 80 track double sided drives even without Ados 3. Auto-dial directory, up to 65,000 entries, set all parameters for each BBS, even terminal type...configurable for any smart modem. RS-232C PAK up to 19,200 baud, SERIAL I/O port up to 9600 baud with type ahead, no lie! Supports MODEM PAK too. 12 macros almost any length, many hot-keys in terminal mode. Now works with Ados 3 also. Comes with users manual and a U.S. wide BBS list. Too spectacular, you've just got to see it to believe it!
 128k CoCo 3 with disk drive required--\$39.95



fileMASTER 2.2.0-Database Management System

The most powerful database management system ever for the coco. Create a library of database full page and mailing label printer output formats...use 1, 2, 3 or 4 across continuous feed labels, do customer mass mailings, etc. Invoices/receipts printed with all information and dollar amounts printed in automatically, taxes and so forth calculated and added for you. Create custom data entry screens, up to 100 fields per screen/record, and up to 255 characters each. Setup custom text processing and mathematical calculations...taxes, APRs, declining balances, etc. Search and choose by multiple criteria when doing...database printer outputs, sorting database records, or just looking up somebody's record! Many, many more features, you could truly run a small business with this system. It took us 15 minutes to set up a custom accounts receivable manager, 5 minutes to create a very large inventory database manager. System ready to run, complete with users manual.
 128k CoCo 3 with at least one disk drive required...\$69.95

Modems 1200 & 2400, great brands & prices...

Name brand 100% Hayes compatible external smart modems. All come with 4pin to 25pin cable, manufacturers instruction manual and warranty. Buy one of these modems and get Utili-Comm for only \$20.00, that's all you need to call and log in a BBS.

B.S.R. 1200	-1 yr. Warranty.....	\$ 79.95	Infotel 2400	-5 yr. Warranty.....	\$139.95
PC Gear 1200	-1 yr. Warranty.....	\$ 79.95	Incrom 2400	-5 yr. Warranty.....	\$139.95
Zuckerboard 1200-2 yr. Warranty.....	\$ 79.95		Atlas 2400	-3 yr. Warranty.....	\$134.95
Avalex 1200	-1 yr. Warranty.....	\$ 76.95	Smart One 2400-2 yr. Warranty.....	\$134.95	
PC Gear 2400	-1 yr. Warranty.....	\$132.95	Zoom 2400	-1 yr. Warranty.....	\$132.95
			Hyundai 2400	-1 yr. Warranty.....	\$129.95

Order info: Add \$3.00 S&H for hardware orders (\$6 if second day air, call to see if your choice is in stock). Software is \$3 S&H for second day air, none otherwise. We accept Mastercard, Visa, Money order, Check (must clear before shipping unless check is certified) and C.O.D. (\$3 ser-charge) orders. Make checks & MOs payable to...

21st. Century Software • P.O. Box 430207 • Kissimmee, Fla. 34743

Exclusive!

CHH PagesE v. 2.0



Desktop Publishing, Greeting Card Designer, Calligrapher or CAD for the CoCo3. Page size 640x384. Pull-down menus, icons and dialog boxes. Import ASCII text or enter from keyboard, mix text with graphics, flow text around irregular shapes. Magnify, flip, enlarge, reduce, stretch and slide screen in seconds. Page preview, select printers from the pull-down menu. Req. CoCo3, Tandy Hi-Res interface, RGB/CHP monitor, joystick/mouse, Epson Star, Panasonic, NX1000, LMP105/106 printer... still only \$49.95

CHH Clipart Set 1 Set 2



Each Set contains 672 clipart pieces for all versions of CHH Pages only. Stunning and detailed... each Set: only \$29.95

CHH Fonts

59 "TAX" like fonts for the Colorfax, Newspaper series and RAT... only \$19.95

CHH Lettrex

Letter-quality text directly from your current software. 14 great MLQ text fonts. Req. 64K CoCo 1/2/3, any monitor, 1 drive, mouse, Epson or compatible printer.. \$24.95



CHH D-Link

Tele File Transfer Program. Graphics interface. Req. CoCo3, RGB or CHP monitor, 1 Drive, joystick/mouse... only \$24.95



UPGRADE POLICY: CHH Pages V.1.0 owners can upgrade to CHH PagesE v.2.0 by sending the original system disk, copy of the sales slip and \$12.00 to the address listed below.

Above programs sold exclusively through

**Goless
Computer
Design**

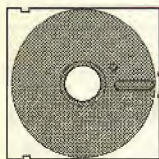
1917 Madera St. #8
 Waukesha, WI 53186
 Phone (414) 549-0750
 Call for a Free Brochure



Sorry, no Credit Cards/COD's - Check or Money Orders only
 All Orders add \$3.00 S&H, WI Residents add 5% Sales Tax

*If you killed it,
you can resurrect it*

by Bill Daniels



ops! You've just killed a needed file on your working disk and backup disk. (Of course you had a backup disk. Anything else is hard to imagine.) You now have a sinking feeling in your stomach, a feeling experienced by all of us at one time or another. However, with *Disk Editor*, this article and some work, there is hope.

It is possible to restore a killed file if a new file has not been saved to the disk on top of the one you killed. When you kill a disk file, its contents are not erased, but you do erase the first character in the filename and one or more entries in the *file allocation table* (FAT). Restore this data and your killed file rises from the ashes.

There is a catch to this. Until you restore the necessary data, the computer doesn't know your file exists. If you save a new file, it may be written on top of the disk space occupied by the killed file, and the game's over before you even start.

The First Step

If you think you may still be in the game, the first thing to do is backup your disk using the `BACKUP` command, which copies the disk in its current state. Be aware that the following procedures are a bit tricky and you can easily scramble your disk if you make an error.

One way to speed up the restoration process is to backup the disk to a suitable RAM disk. Disk scanning, editing and testing is done faster in memory. After you are satisfied the RAM disk is right, copy it back to a physical disk.

Bill Daniels has been programming the CoCo since 1981. He and his wife, Gladys, operate an accounting service using CoCo's exclusively. You can contact him at P.O. Box 124, Station A, Mississauga, Ontario Canada L5A 2Z7.

Finding and Editing Data

Next you must attain the ability to scan the disk's directory and change the necessary fields. Some commercial utility programs scan the disk and change it one byte at a time. If you have such a program, you're in good shape; otherwise, use Listing 1, `DISKEDT`.

Disk Editor scans a disk in 256-byte blocks or on a byte-by-byte basis. It works in everyday decimal notation, so the maximum number of readers are able to make use of this article and the program.

Directory Information

A directory containing the filenames and related information is located on Track 17, from sectors 3 to 18, on all RS-DOS disks with enough space for 128 filenames. However, standard 35-track disks have a limit of 68 filenames, which extend only to Sector 11 and leave sectors 1 and 12 through 18 unused.

Each filename entry uses 32 bytes as shown in Table 1. When a file is killed, the first character of the filename is changed to a zero. The other 31 bytes of the entry (as well as the file itself) remain intact until a new file writes over them. The FAT entries (in Sector 2) for the killed file are changed to 255.

The remaining directory entries to the end of Sector 18 are filled with 255. Therefore, when you see directory entries containing 255, you have found the end of the directory.

You can trace the whole file through the file allocation table using Table 2, which converts granules to tracks and sectors.

The File Allocation Table

The file allocation table (FAT) is located on Track 17, Sector 2 and uses only sufficient entries to represent each granule used in the system (one byte per granule).

The standard system has 68 granules (0 to 67), but modified systems using 40- or 80-tracks may contain up to 158 granules. A

granule equals nine 256-byte sectors. Therefore, each track on the disk has two granules assigned to it except for the directory track (Track 17). All entries in Sector 2 that are not part of the FAT contain a value of zero.

The file allocation table consists of an array of 68 single-byte entries that represent each of the 68 granules on a one-for-one basis. That is, the first entry in the FAT is for the first granule on the disk, the second entry is for the second granule and so on. If your file is stored on more than one granule, the FAT entry contains a number from 1 to 68 that points to the next granule of the file.

The entry representing the last granule of the file contains a value from 192 to 201 (\$C0 to \$C9). A value of 192 (\$C0) means the file exists in name only, and no sectors are allocated to this file. The values from 193 (\$C1) to 201 (\$C9) represent the nine sectors of a granule. For example, if the last entry in the chain is 196 (\$C4), just the first four sectors of the granule are used. From a binary perspective, the two most-significant bits set in the upper nibble (1100) indicate the end of the chain, and the lower nibble indicates the number of sectors in use. Remember from above that the 16th byte of the directory entry reveals the actual number of bytes used in the last sector of the file — a value between 0 and 255.

Sectors 1 through 9 are always assigned to granules with an even number and are always allocated first. Sectors 10 through 18 are always assigned to odd-numbered granules and are allocated only after all the even-numbered granules are allocated.

Restoring Killed Files

There are three stages to restoring killed files. First begin by replacing the zero kill flag stored in the first byte of the filename in the directory with the first character of the actual filename. Look at the 14th byte for the starting granule number. Use the granule/track conversion table (Table 2) to find the correct track to start with. Next scan the disk and follow the file to determine all of its granule numbers. Finally, complete the restoration by replacing 255 in the FAT entries with the correct granule numbers.

Easier Said Than Done

To follow a file from granule-to-granule requires effort. For a large file it may not be worth it if you have other alternatives. You must bear in mind how the computer assigns granules. It works from the directory Track 17 alternately downward or upward, looking for available granules. It goes for an even granule number first and tries to keep all parts of a file on one side of Track 17, but gives up

Byte	Contents
0-7	Filename
8-10	Filename extension
11	File type 0 = BASIC program 1 = BASIC data file 2 = Machine language program 3 = Text editor source file
12	ASCII flag 00 = Binary FF = ASCII
13	Number of the first granule for the file
14-15	Number of bytes in use in the last sector of the file
16-31	Reserved for future use

Figure 1: Disk Directory Entry

ALPHA SOFTWARE TECHNOLOGIES

COMM - 4

ATTENTION!! Alpha software technologies has teamed up with COCO devices to bring you the incredible COMM - 4 port! 4 ports in one slot! That's right, up to 4 users at one time! Special pulsed IRQ line helps to prevent lockups! External IRQ line allows you to connect to an IRQ hack mod. Totally compatible 8551 technology, no special drivers needed! Comes complete with networking software that allows multiple computers to share peripherals! A must for any BBS user! A perfect match for OS9 Level II BBS! \$124.95

OS9 Level II BBS Release 3.0

System comes complete and ready to run. Use the build in menus or create your own. Run your own programs or games on-line! Complete message system included. File transfer system supports Xmodem and Ymodem plus automatic validation with keyword searching! Even comes with its own terminal program free! Now includes ANSI graphics menus and editor! See board while it runs! For a DEMO call (504)649-5761 (3/12/2400 Baud). Galactic Conflict game also included! 512k OS9 Level II and RS-232 (or COMM-4) pak required..... \$ 29.95

Presto - Partner

This is what you have been waiting for! Finally RAM-Resident software for your COCO 3! Runs in the background while you do other work! Includes a note-pad that does automatic number calculations, a calendar with alarm, a phone book that can auto-dial your phone, a real-time clock and much, much, more! This program will organize your entire life! 512k OS9 Level II Required (Hayes compatible modem required for auto-dial) 512k OS9 Level II Required..... \$ 29.95

Level II Tools

Without the right tools OS9 is difficult...These ARE the right tools! With these great utilities anyone can use OS9 like a pro! Complete wildcard, tree and windowing commands make OS9 easy to use! If you want to start using OS9, this is what you need! If you already use OS9, these tools will save you hours of time and headaches! 25 great utilities in one package..... \$ 24.95

Disk Manager Tree

This versatile utility makes your OS9 life a breeze! No more fighting with complex directory structures! No more searching for files and typing long path names! Everything is displayed using windows! Allows you to change, create, and delete directories with single keystrokes! Also allows you to copy, view and delete files just as easily! A must for the OS9 beginner. A great time saver for the experienced OS9 user. Save hours of time and headaches! 512k OS9 Level II Required..... \$ 29.95

Multi - Menu

This great Multi-View utility allows you to easily create your own pop-down menus! No programming experience is required, because no programming is done! You will be able to run any OS9 command or program from a menu! Menu creation is super simple, super easy! Actually see the menu as it develops. A must for Multi-View users! Make that non Multi-View software run in Multi-View! 512k OS9 Level II and Multi-View required..... \$ 19.95

Warp-One

Finally, a complete OS9 Level II windowing terminal program. Many features include Auto-dial & macro, X & Y modem, ANSI graphics, buffer capture, on-line timer, chat mode, windows, and much, much, more! Perfect for any BBS user! More power than you'll ever need! 512k OS9 Level II & RS-232 Pak Required..... \$ 34.95

The Zapper

This wonderful utility allows you to patch anything! Patch commands directly on disk and fix CRCs automatically! Patch the OS9 Boot file! Save lost files! Fix crashed disks! One use of this program could be worth the price! 64k OS9 Level I or II required..... \$ 19.95

Send check or money order to: Alpha Software Technologies, 210 Bluefield Dr., Slidell, LA 70458..... (504)649-5176 (voice)
..... (504)649-5761 (BBS)
Please add \$3.00 Shipping and handling, all orders shipped same day via first class mail. Most orders arrive in 2 to 3 days. COD orders add \$2.50 extra.



Not only does Tandy produce our favorite CoCo, we think it produces the best portable and MS-DOS computers as well. We've found that when satisfied Color Computer users decide to add portability or MS-DOS to their computing habits, many stick with Tandy. For these people we publish PCM, The *Premier* Personal Computer Magazine for Tandy Computer Users.

Each month in PCM, you'll find information and programs for the Tandy 100, 102 and 200 portable computers. And you'll find even more coverage for Tandy's MS-DOS machines — from the graphics of the 1000 to the power of the 5000.

PROGRAMS AND PROGRAM DISKS!

We learned from THE RAINBOW that readers want programs to type in, so each month we bring you an assortment of them: games, utilities, graphics, and home and business applications. For those who don't have time to type in listings, we offer a companion disk with all the programs from the magazine. Also included in PCM each month is the *Software Shopper*, an "onmail" database service from which you can order the latest shareware products from our Delphi databases for Tandy MS-DOS and PC users — even if you don't have a modem!

TUTORIALS AND PRODUCT REVIEWS!

As if all this weren't enough, we offer regular tutorials on *DeskMate*, telecommunications and hardware; assembly language, BASIC and PASCAL programming tips; and in-depth reviews of the new software, peripherals and services as they are released. Add it all up and we think you'll find PCM to be the most informative and fun magazine for this market today!

YES! Please send me a one year (12 issues) subscription to PCM for only \$28.* A savings of 22% off the newsstand price.

Name _____

Address _____

City _____

State _____

ZIP _____

In order to hold down costs, we do not bill.

My check in the amount of _____ is enclosed.

Charge to my:

☐ VISA ☐ MasterCard ☐ American Express

Acct. # _____

Exp. Date ____ Signature _____

To order by phone (credit card orders only) call 800-847-0309, 8 a.m. to 5 p.m. EST. For other inquiries call 502-228-4492.

* Canadian subscribers U.S. \$38. Surface rate elsewhere \$64, airmail \$85. Allow 6 to 8 weeks for first copy. Kentucky residents add 5% sales tax. U.S. currency *only*, please.

Mail to: PCM, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

OUR LATEST 30 ISSUES

ISSUE #63, SEP. 1987
GENEOLOGIST HELPER
SMART COPY
MAINTENANCE
COCO3 - COCO2 HELP
DIRECTORY PICTURE
SUBSTANTIAL ATTACK
SAVE THE MAIDEN
CAVIATOR
ELECTRONICS 6
MONKEY SHINE

ISSUE #64, OCT. 1987
GARDEN PLANTS
FORT KNOX
ELECTRON FORMULAS
SNAKE IN THE GRASS
CYCLE JUMP
GEOMETRY
WIZARD
GAME OF LIFE
ELECTRONICS 7
FLIGHT SIMULATOR

ISSUE #65, NOV. 1987
TAXMAN
DAISY DOT
CHILD STONE ADVENT.
SIR EGGBERT
CROWN QUEST
GYM KHANA
COCO 3 DRAWER
FOOTBALL
ELECTRONICS 8
CHOP

ISSUE #66, DEC. 1987
ONE ROOM ADVENTURE
OS9 TUTORIAL
RIVER CAPTAIN
SOUNDS
BETTING POOL
ADVANCE
MATH TABLES
ELECTRONICS 9
LOWER TO UPPER
NOIDS

ISSUE #67, JAN. 1988
MEDIA MASTER
SAVE THE EARTH
WEIGHTS & MEASURES
LOW RES GRAPHICS
COAST TO COAST
BACCARAT
BATTLE SHIP
ELECTRONICS 10
TAPE CONVENIENCE
DUEL

ISSUE #68, FEB. 1988
COINFILE
WORD COUNTER
SQUIRREL ADVENTURE
AREA CODES
DRAW POKER
TURTLE RACES
ELECTRONICS 11
MULTI-SCREEN
CANON PRINT
COCO TENNIS

ISSUE #69, MAR. 1988
POLICE CADET
STAMP COLLECTION
BARRACKS ADVENTURE
CITY/TIME
HI-LOCRAPS
OLYMPICS
HI-RES CHESS
ELECTRONICS 12
DOUBLE EDITOR
DOUBLE BREAKOUT

ISSUE #70, APR. 1988
BLOTTO DICE
SUPER COMM
GENESIS ADVENTURE
PLANETS
PHKWAR
SIGN LANGUAGE
ARX SHOOTOUT
ELECTRONICS 13
MAGIC KEY
SNAP PRINT

ISSUE #71, MAY 1988
SUPER LOTTO
RODOL ADVENTURE
MAZE
YAHTZEE3
PHASER
SHAPES/PLATES
STAR WARS
ELECTRONICS 14
PRINTER CONTROL
MAZE 2

ISSUE #72, JUNE 1988
MARKET WATCHER
3 STOOGES
HOSTAGE ADVENTURE
PROGRAM TRIO
GLADIATOR
U.S. & CANADA QUIZ
JEOPARDY
ELECTRONICS 15
COCO 3 PRINT
CTTY

ISSUE #73, JULY 1988
FOREIGN OBJECTS
CHESS FUNDAMENTALS
WATERFOWL QUIZ
WHAMMY 3
ADVENTURE TUTORIAL
CIRCLE 3
EDUCATION TRIO
WRITE-UP EDITOR
PICTURE PACKER
AIR ATTACK

ISSUE #74, AUG. 1988
VIDEO CAT 3
1 EYE WILLIE
JAVA
GAME TRIO
CRONAUT WARRIOR
ENVELOPE PRINT
RAM DRIVE 3
MODE 2
XMODEM TRANSFER
CAVE II

ISSUE #75, SEP. 1988
DRACULA ADVENTURE
HELP TRIO PROGRAM
SHOWDOWN DICE
TARZAR 1 ADVENTURE
ARAKNON
CASH FLOW REPORTING
GRAPHICS LETTER
GRAPHIC EDITOR
ADDRESS BOOK
SQUARES

ISSUE #76, OCT. 1988
SUPER BLITZ 3
CHAMBERS
TRIO RACE
EARTH TROOPER
STARGATE
BOWLING SECRETARY
DISK TUTORIAL
JOYSTICK > KEYBOARD
KEYBOARD < JOYSTICK
SAILOMAN

ISSUE #77, NOV. 1988
POLICE CADET #2
STARSHIP SHOWDOWN
MUSIC COMPOSER
COUPONS/REBATES
PROGRAM LIBRARY
BOYSCOUT SEMAPHOR
HOUSEHOLD CHORES
MAXOMAR ADVENTURE
CHUCK LUCK3
BUZZARD BAIT

ISSUE #78, DEC. 1988
POLICE CADET #3
TANK TURRET
WAR OF THE WORLDS
SPINSTER CAFE
COCO-SIZE
SIGN MAKER
LEGAL DEDUCTIONS
BOOK KEEPING
CAR LEASE 3
WAREHOUS MUTANTS

ISSUE #79, JAN. 1989
POLICE CADET #4
DRAW POKER 3
TILER TEX
BATTLE
INSIDE THE COCO
COCO BULLETIN BOARD
HOT DIRECTORY
VCR TUTORIAL
PRINTER CONTROL
THE KING

ISSUE #80, FEB. 1989
SCRABBLE
SPELLING CHECKER
SANDSTONE ADVNT.
THE FAMILY FEUD
HARNESS3 HANDICAP
MINIGOLF 3
ULTIMATE 3
NETWORKING TUTORIAL
A-MAZING PLACE
MONEY POLY

ISSUE #81, MAR. 1989
MONSTERS
SUPER CONCENTRATION
TEN PROGRAMS COCO3
FINANCE
SNOWBALL FIGHT
RULER
POP-UP WINDOWS
TARZAR2 - CASTLE
SUPER LISTER
DRACONIAN

ISSUE #82, APR. 1989
DUNGEON MAZE
DISK TRANSFER
MAIL MERGE
SUPER SPREADSHEET
BLASTER
TILER TWO
DREAM TUNNEL
DISK UTILITY 3
EDUCATION TRIO
LUNCHTIME

ISSUE #83, MAY 1989
T&D FIRST 80
MODERN BATTLESHIP
CHURCH MANAGER
SUPER FILE SORT
BASEBALL STATS
TARZAR PT. 3
INVOICE
CARD SQUEEZE
SWORDPLAY 1 + 2
BREWMASTER

ISSUE #84, JUNE 1989
CROSSWORD PUZZLES
MOUNT DEATH
TERRON
DISK/TAPE TRANSFER
PAPER WORKS
SUPER DATABASE
CONNECT3
BUSINESS MODEL
MASS FORMAT
CHAMBERS

ISSUE #85, JULY 1989
5 PLAYER POKER
RESUME WRITER
CRAZY CHEMIST
JOURNEY UP
SUBMAINA
WORKBENCH
VACATION PLANNER
DISK EDITOR II
NIGHT OF THE NINJA
MARIAN CHYPI

ISSUE #86, AUG. 1989
TIME TRAP
PHONE ACCOUNTANT
ON TARGET
NAME THAT TUNE 3
LASER DEFENCE
CHECKBOOK BALANCER 3
KROACH ADVENTURE
SUPER BAR GRAPH
EASY LETTER
DEVIL ASSAULT

ISSUE #87, SEPT. 1989
PURCHASE ORDER
INVENTORY INVOICE
AMERICAN TRIVIA
KROACH2 ADVENTURE
TETRA
SOLO POKER
GALAXY Q3
IBM PICTURE VIEWER
RGB PATCH
KING JUI

ISSUE #88, OCT. 1989
SALES PROSPECTING
VIRUS 3
WILL MAKER
JOURNAL-GEN. LEDGER
POLICE CADET #5
RED DOG
MAD LIBS
MACINTOSH PICT. SAVER
FROG
PST FLIGHT SIMULATOR

ISSUE #89, NOV. 1989
SPEECH INDEXER
QUEST ADVENTURE
EDUCATION TRIOS
BIG LETTER
PANGO
ELEMENTS
GARDEN PLANNER
VIDEO SHOW
WARP
QUIX

ISSUE #90, DEC. 1989
MUSIC-4 VOICE
HONEYCOMB
POINT OF SALE
ORBS ADVENTURE
IBM - COCO
CIVIL WAR
LIST UTILITIES
BREAK-IN COCO III
LABYRINTH MASTER
COLOR CARTOON

ISSUE #91, JAN 1990
TRENCH FIGHTER
COCVET3
SPEED GAMES
BUSINESS STARTER
CAVERN QUEST3 PT. 2
BUILDERS HELPER
TARZAR IV
ADDRESS IT
ANIMAL GRAPHICS
SKYWAY

ISSUE #92, FEB 1990
PENTA-SAME
ROTISSERIE LEAGUE
NICK'S QUEST
SOLITAIR
EDUCATION 4
IBM - BASIC
BASEBALL CARD ORG.
MUNCHY 3
RIVER RAID 3
CUBER

ISSUE #93, MAR 1990
MR. MOVIE
INVADERS
COCO3 RECIPE MACHINE
SILVERCAPE 3 ADV.
BABY-SITTER'S BASE
BIBLE SCRIPTURE
VOCABULARY QUIZ
DROP PACK
DOCTOR WHO 3
GRABBER

**EACH ISSUE
CONTAINS 10 PROGRAMS
READY TO LOAD.**

AVAILABLE ON TAPE OR DISK.

SUPER SAVINGS

SINGLE ISSUE.....	\$ 8.00
2-5 ISSUES.....	\$ 6.00 EA
6-10 ISSUES.....	\$ 5.00 EA
11 OR MORE ISSUES.....	\$ 4.50 EA
ALL 93 ISSUES.....	\$ 245.00

PURCHASE 20 OR MORE ISSUES
AND RECEIVE A FREE
6 MONTH SUBSCRIPTION



COCO I, II, AND III

- All Programs Include Documentation.
- We Send 1st Class - No Charge!
- For Information On Other Software,
Turn to Pages 61 & 77

**ONE YEAR
SUBSCRIPTION
ONLY
\$ 70.00 !**



TOM MIX PROGRAMS

Mail Or Call



T&D SOFTWARE
2490 MILES STANDISH DR.
HOLLAND, MI. 49424
(616) 399-9648

PLEASE CIRCLE

**TAPE
OR
DISK**

1	9	17	25	33	41	49	57	65	73	81	89
2	10	18	26	34	42	50	58	66	74	82	90
3	11	19	27	35	43	51	59	67	75	83	91
4	12	20	28	36	44	52	60	68	76	84	92
5	13	21	29	37	45	53	61	69	77	85	93
6	14	22	30	38	46	54	62	70	78	86	
7	15	23	31	39	47	55	63	71	79	87	
8	16	24	32	40	48	56	64	72	80	88	

Name _____

Address _____

City _____ State _____ Zip _____

Card # _____ Total \$ _____

and goes to the other side if it must (if there are no available granules on the first side).

As an example, assume that the 14th byte in the directory for a killed file contains the number 31. This is Track 15, sectors 10 through 18. Scanning these sectors we find that the file continues past Sector 18. Since Track 15 is less than 17, the next granule of the file should be on a lower track. The FAT entries for Track 14 (granules 28 and 29) are not 255, meaning Track 14 is in use. But the FAT entries for granules 26 and 27 are 255. Therefore the next part of your file should be in those granules starting with Track 13, Sector 1. Change the 255 in the FAT entry for Granule 31 to 26 and continue following the file to lower-numbered tracks.

Finding the End of the File

One of the tricky aspects of tracking a file is knowing where it ends. Garbage, or data from a previously killed file, often follows at the end of the file you are tracking. This tends to obscure the end

of the file. Remember that the 16th byte of the filename entry contains the exact number of bytes in the last sector of the file. Therefore when you reach the right sector, you know the exact location of the last byte.

Data files, ASCII text files and ASCII BASIC files do not have end-of-file markers. (An ASCII BASIC file is a BASIC file saved with the A option. Text files are normally generated by word processors or assemblers.) However, their contents usually make sense, so combined with the knowledge of the position of the last byte in the last sector, you should be able to see the end of the file.

ASCII BASIC and text files end each line with a carriage return (decimal 13), so it follows the last byte of such a file will also be a carriage return.

Binary BASIC files end with three zeroes. Machine language files end with a 255, two zeroes and two bytes representing the execution address.

The second and third bytes of both binary BASIC and single-segment Machine language files contain the length of the file. You multiply the number contained in the second byte of the file by 256 and add the number contained in the third byte. That is the length of the file in bytes. Since there are 2304 bytes in a granule and 256 bytes in a sector, you can easily calculate the number of granules used in the file and the number of sectors used in the last granule.

Machine language files can be made up of a number of segments joined together into one file. In this case, the second and third bytes of the file contain only the length of the first segment. Between segments there is a zero, two bytes representing the length of the next segment and two bytes for the loading address of the segment. Remember, if you do not see a 255 followed by two zeroes, you are not at the end of the file.

The Disk Editor

Disk Editor is written in BASIC and works on any CoCo. Extensive use of comments allow easy changes, but you can later edit them out (as well as most spaces) to make the program execute a little faster.

The program uses a poke to speed-up the display, but if you make changes, be sure to use the low-speed poke before any disk I/O or printing or you will have problems. High-speed pokes in lines 370, 425 and 469 and slow-speed pokes in lines 170 and 510 are for a CoCo 3. If you have a CoCo 1 or 2, change the high-speed pokes to 65495,0 and the slow-speed pokes to 65494,0.

When you run the program, all options are accessed from one screen display. If you do not see a flashing cursor, the program is waiting for you to select one of the three menu options or to press the CLEAR or the up/down arrow keys.

If you see a cursor, you must type in a response. A null entry returns you to the selection menu. The CLEAR key toggles between two modes: one to display a complete 256-byte sector at once, the other to display 64-byte segments of a sector in two lines and 16 bytes in the next six lines. These six lines show a table of the offset, the value at that offset and the ASCII character represented by that value.

The purpose of the first mode is to quickly scan through a granule 256 bytes at a time. The second mode has the detail for editing (Option 2).

Ready to Go

With the information provided here and *Disk Editor*, you are now in a position to unravel many of the mysteries of disk storage. Even if you do not have a killed file, run *Disk Editor* just to sight-see through the directory and track a file. Or you could kill a file (on a backup, of course) to try your hand at file resurrection. It will be a useful experience.

Granule	Track/Sectors	Granule	Track/Sectors
0	0/1-9	1	0/10-18
2	1/1-9	3	1/10-18
4	2/1-9	5	2/10-18
6	3/1-9	7	3/10-18
8	4/1-9	9	4/10-18
10	5/1-9	11	5/10-18
12	6/1-9	13	6/10-18
14	7/1-9	15	7/10-18
16	8/1-9	17	8/10-18
18	9/1-9	19	9/10-18
20	1/1-9	21	10/10-18
22	1/1-9	23	11/10-18
24	12/1-9	25	12/10-18
26	13/1-9	27	13/10-18
28	14/1-9	29	14/10-18
30	15/1-9	31	15/10-18
32	16/1-9	33	16/10-18
34	18/1-9	35	18/10-18
36	19/1-9	37	19/10-18
38	20/1-9	39	20/10-18
40	21/1-9	41	21/10-18
42	22/1-9	43	22/10-18
44	23/1-9	45	23/10-18
46	24/1-9	47	24/10-18
48	25/1-9	49	25/10-18
50	26/1-9	51	26/10-18
52	27/1-9	53	27/10-18
54	28/1-9	55	28/10-18
56	29/1-9	57	29/10-18
58	30/1-9	59	30/10-18
60	31/1-9	61	31/10-18
62	32/1-9	63	32/10-18
64	33/1-9	65	33/10-18
66	34/1-9	67	34/10-18
68	35/1-9	69	35/10-18
70	36/1-9	71	36/10-18
72	37/1-9	73	37/10-18
74	38/1-9	75	38/10-18
76	39/1-9	77	39/10-18

Table 2. Granule/Track Conversion

Unlock The Real Power of Your CoCo !

"BIG BASIC" Basic Users get full control of managing all CoCo memory

COCO 3'S MISSING LINK

"Danosoft has a winner in *Big Basic*, and I would recommend it to anyone wanting to get the most out of a Color Computer 3." - Rainbow, Oct./89.

- Now you can access up to 472K of memory in a 512K CoCo or up to 92K in a 128K machine with any mix of programs and/or data. At last, you can do sizable basic programming with a CoCo 3.
- BIG BASIC creates programming windows where you can put up to 58 separate running programs, or up to 58 parts of one large program or database. Concept permits big programs to run fast.
- Chain in unlimited sized programs, or program parts, or data, from disk(s) without erasing existing programming or variables. Also works with the RGB-DOS Hard Disk system and ADOS3.
- 3 new simple basic words create the power.
- Provides for holding as many as 28 Hi-Res Graphics Screens in Memory for instant recall. Up to 4 HSCREEN1's in a 128 K CoCo.
- Modifies your basic operating system in some 70 locations but does not occupy user memory. 100 % M.L. runs in background.
- Includes 7 Demo Programs and Manual. Any disk version RS-DOS.

ONLY \$39.95 U.S. or \$46.50 CDN. + \$2.50 S & H (Add 8% PST in Ont.)

"BIG RAMDISK" (512k CoCo3 V.2.0 or V.2.1)

"Danosoft's *Big Ramdisk* is a thoroughly useful utility that combines a great product with the ease of use that marks a winner." - Rainbow, April 1990.

- Copy or backup your programs or data to "BIG RAMDISK" and get the speed of program/data saving or loading to an "in memory" M.L. device. ("COPYDISK" Utility included.)
- Great for use with all other programs on this page (except "Simply Better") and most commercial software.
- You can install, re-install, format and reformat from direct mode or from a program without erasing programming or variables. Does not occupy user memory, but can be user located elsewhere if needed.
- Your choice of one big 158 granule ramdisk (80 tracks-360k) or two 68 or 78 granule ramdisks (35-40 tracks to 360k total), depending on your DOS. (i.e. RS-DOS, "BIG DISK", "DOUBLE40", etc.) Allows 4 physical drives and 2 ramdisks.
- Ramdisk files and directory do not erase with a reset or if a program crashes. This lets you use some programs that need a Coldstart to exit.

ONLY \$12.95 US or \$14.95 CDN. + \$2.50 S & H (Add 8% PST in Ont.)

"BABY BASIC" If you need more memory for Basic program lines, this Tutorial will show you how to store and execute them from anywhere in memory; and how to chain in any number of program modules from disk without erasing variables. Includes Disk with 7 basic enabling subs and a demo program. For any CoCo with 64K or more. Doesn't replace "Big Basic". Only \$8.95 U.S. or \$10.50 CDN. + \$2.50 S&H (Add 8% PST in Ont.)

"GRAPHICS UTILITY" If you want to store multiple Hi-Res Graphics screens in CoCo3 memory for instant recall, this Tutorial is for you. Load/Save graphics screens to memory from disk. Instantly switch them into your program. Max capacity is : HSCREENS 1 & 3 : 512K = 27 ; 128K = 3. HSCREENS 2 & 4 : 512K = 13 ; 128K = 1. Has Disk & Demo. Only \$8.95 U.S. or \$10.50 CDN. + \$2.50 S&H (Add 8% PST in Ont.)

"MEMORY MASTER"

OUR FAVORITE PROGRAMMING TOOL

"*Memory Master* is a unique hacker's program offering about all you could ask for in a disk and memory utility." - Rainbow, Sept./89.

- Scan, Edit, Copy, Printout any memory in your computer or on disk. Fix disks. Restore killed files.
- Fast entry of M.L. Listings.
- Dual Windows! Runs 2 Basic Programs at once!
- Disk chains unlimited amounts of program sections or data.
- Includes Demo Program and Manual.
- Any CoCo (at least 64K) with 1.1 or 2.1 Disk Extended Basic

Only \$24.95 U.S. or \$28.95 CDN. + \$2.50 S & H (Add 8% PST in Ont.)



"UTILITIES PACKAGE"

ACCESS BOTH SIDES OF YOUR DRIVES

"Must - have software for the disk user"

- Rainbow, Nov. /89.

"BIG DISK"

- Makes computer see double-sided drives as one 360K (80tk) drive; 158 granules.

"DOUBLE40"

- Sets drives for 40 tracks each side.

"CONVERT/DISK"

- Formats 40 tracks on each side of a disk without disturbing the first 35. Doubles all your present storage.

"QUIKDRIV/6MS"

- Sets fast drive stepping rate.

"QUIKDRIV/30M"

- Fast drive shut off.

"SET FEED"

- Sets line spacing for printouts.

All are Machine Language Running in Background

For any CoCo (at least 64K) with 1.1 or 2.1 Disk Extended Basic

Only \$17.95 U.S. or \$20.85 CDN. + \$2.50 S & H (Add 8% PST in Ont.)

NOW FROM DANOSOFT! DALE RICKERT'S

Feature Packed



"Simply Better"

- Run 2 interactive Wordprocessors at once • Mail Merge • Create Indexes • Table of Contents • Print-Fill Forms • Displays Fonts in Colors •

Displays Underlining • Print Spooling • Auto Saves • Print/Save Blocks of Text • To 480K of Text Storage • Sorts Text • Numbering • Indenting • Calculator • Tasks • Headers • Footers • Paging • Finds • Case Reversal • Help Screens • Preview "WYSIWYG" • Many More Features.

BEST WORD PROCESSOR

Easy to use. Includes some Database Features

Will hold a customer list of more than 5000 in memory for quick recall or editing.

"Significantly Better? Mais Oui!" - Rainbow, Feb., 1990

"..... An excellent choice at an unbelievable price." - Rainbow, April /89

Includes extensive, well indexed Manual, with Tutorials.

128k or 512k CoCo3 V.2.0 or V.2.1

ONLY \$39.95 U.S. or \$46.50 CDN. + \$2.50 S & H (Add 8% PST in Ont.)

Add \$7.00 U.S. or \$8.20 CDN. for French Version of Manual

Need more info? See the Rainbow Reviews of these Programs.

DANOSOFT

Box 124, Station "A"

Mississauga, Ontario L5A 2Z7

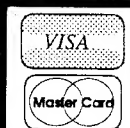
10% Discount

on purchase of
3 or more items
at the same time.

Order by Phone or Mail

(416) 897-0121

Shipped Airmail Same Day



Protect and highlight your important magazine collection with sturdy RAINBOW binders



Distinctive, Durable RAINBOW Binders

THE RAINBOW is a vital resource to be referred to again and again. Keep your copies of THE RAINBOW safe in our quality, distinctive binders that provide complete protection.

These attractive red vinyl binders showcase your collection and ensure your RAINBOWs are in mint condition for future use. Each binder is richly embossed with the magazine's name in gold on the front and spine. They make a handsome addition to any room.

Put an End to Clutter

Organize your workspace with these tasteful binders. Spend more time with your CoCo and eliminate those frustrating searches for misplaced magazines.

A set of two binders, which holds a full 12 issues of THE RAINBOW, is only \$13.50 (plus \$2.50 shipping and handling).

Special Discounts on Past Issues

To help you complete your collection of THE RAINBOW, we're offering a special discount on past issues of the magazine.

When you place an order for six or more back issues of THE RAINBOW at the same time you order binders, you are entitled to \$1 off the regular back issue price. To order, please see the "Back Issue Information" page in this issue.

Know Where to Look

You may purchase the "Official And Compleat Index To THE RAINBOW" for \$1 when you purchase a set of binders. This comprehensive index of RAINBOW's first three years (July 1981 through July 1984) is usually priced at \$2.50.

For greater
convenience, order
RAINBOW Binders
through the
shopping area of the
CoCo SIG of Delphi!

____ YES. Please send me _____ set(s) of RAINBOW binders

Take advantage of these special offers with your binder purchase:

____ Save \$1 off the single issue cover price for back issues. Minimum order of 6 magazines. Please enclose a back issue order form from a recent issue indicating magazines wanted.

____ Purchase the "Official and Compleat Index to THE RAINBOW" for \$1. (Regular price \$2.50.)

(These offers good only with the purchase of a RAINBOW binder set)

Name _____

Address _____

City _____ State _____ ZIP _____

☐ My check in the amount of _____ is enclosed. (In order to hold down costs, we do not bill.)

Charge to: ☐ VISA ☐ MasterCard ☐ American Express

Account Number _____ Expiration Date _____

Signature _____

Mail to: Rainbow Binders, The Falsoft Building, P.O. Box 385, Prospect, KY 40059.

Binders are \$13.50 per two-binder set plus \$2.50 shipping and handling. If your order is to be sent via U.S. mail to a post office box or foreign country, please add \$2. Kentucky residents add 5% sales tax. U.S. currency only, please. In order to hold down non-editorial costs, we do not bill.

For credit card orders call (800) 847-0309, 8 a.m. to 5 p.m. EST

All other inquiries call (502) 228-4492.



✓ 100	29
140	210
190	35
250	35
315	213
350	83
365	138
373	57
383	250
395	207
397	32
430	43
460	110
469	218
505	254
525	230
590	57
620	96
710	11
END	205

The Listing: DISKEDT

WITH THE 32-COLUMN SCREEN.

0 'COPYRIGHT 1990 FALSOFT, INC.
 10 '
 20 ' "DISK EDITOR"
 30 '
 40 ' BY BILL DANIELS
 50 '
 60 ' FOR USE BY ANY MODEL COCO

70 '
 80 CLEAR 1500 'CLEAR AMPLE
 STRING SPACE.
 90 '
 100 DIM A,X,C,D,X\$,Y\$,Z\$,V\$,K\$,C
 \$,T,S,E 'DIMENSION VARIABLES.
 110 K\$ = CHR\$(128): C\$ = CHR\$(58
): S\$ = STRING\$(28,32) ' FOR USE

Nearly 200 Color Computer Software Titles!

Call today to get your free 1990 Express Order Software Buyer's Guide. Choose from popular games, educational packages, productivity software and more. It's the fast and easy way to get the software you really want.

**EXPRESS
ORDER**
 A DIVISION OF TANDY CORPORATION

1-800-321-3133

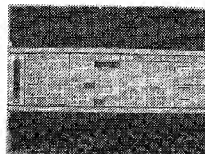
Overlord



Peace through superior firepower is the catch phrase in this sophisticated wargame simulator. Victory shall not fall to he who is the mightiest, oh no, but to he who can plan ahead and develop the better strategy. You must ensure that all your troops are brought into battle at the right moment, and for that you must set your most industrialized cities to producing troop transporters. Other cities will build Aircraft carriers, fighter jets, paratroop regiments, submarines, spy planes, battleships, destroyers, and cruisers. Up to three people can play the game simultaneously, each starting out at his own base city, each knowing nothing about the strengths and locations of his enemies' forces. The player's own combat troops will head out, exploring the world as they go, capturing towns that lie waiting, or engaging the enemy face to face. You can set any or all of the three players to be operated by the sinister silicon brain of your CoCo 3, and battle them or let them battle each other.

Price: \$29 US / \$34 Cdn. (Now shipping v1.1)
 Overlord requires: 128k CoCo 3, 1 drive and a mouse or joystick.

Studio Works Professional: *New!* Studio quality digital audio is here!



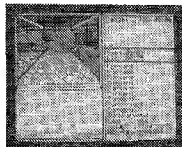
A new hardware pack developed by Oblique Triad allows our new software to record at 35kHz at eight bits wide! Your CoCo3 is now a serious, professional quality digital sampling system. The optional MIDI slave mode (cable required) lets you 'play' your CoCo from your MIDI computer or synthesizer. The built-in rigid tempo sequencer will let you lay down a

useful, studio quality rhythm section. New 'scale' feature lets you play any of up to 55 (512k) sounds effects directly from CoCo's keyboard, one on each row, low to high from left to right. Two zoom windows allow for perfect loop setting down to the byte. Support for Disto/CRC's 1 meg RAM card, our 8-bit output option (built into the pack), Orchestra 90CC, hires mouse. 25 seconds of CD-quality in 1 Meg! Point-and-click operation, clipboards, too many features to list! (Call for SWPro FX discs!)

Requires: 128k CoCo 3, 1 drive.

Hint Books!
 Caladuril 1 and 2
 books :20 pp, \$3.50.
 Seventh Link books
 are 40 pages, \$5.50

the Seventh Link



The Seventh Link is still the best fantasy role-playing adventure the CoCo has ever seen, but none, 3 discs

are filled with worlds, towns, castles, and spectacular 3D dungeons filled with full colour, hi-res monsters, ladders, doors and pits, chests, pools, lava and flooded rooms. You would not believe that a CoCo 3 could produce such high speed detailed graphics. In the wild lands above, you'll find monsters, towns and castles. The towns will reveal merchants, learned locals, even friends who will join your quest. Look no further for the best in hard-core adventure. \$38 US / \$48 Cdn. Req: CoCo3, 40 track drive

Caladuril II: Weatherstone's End

"Some of the best graphics to be seen on a CoCo 3" will amaze you as you attempt to discover the fate of the Weatherstone. Smooth scrolling 16 colour graphics and a sophisticated command interpreter lend realism and enjoyment to one of the most extensive adventures to be found on a CoCo. Package includes 2 discs, an 11x17" map, a velvet pouch of powerstones and a 20 page booklet.

Price: \$32 US / \$38 Cdn
 (Caladuril I: \$18/\$24, CoCo2, drive)



Those Darn Marbles

Dedicate a program to 512k machines only, and all sorts of new things are possible. Those Darn Marbles is the first CoCo game to use the built-in hardware screen scrolling features of the CoCo 3. This means that all the computer's time can be dedicated to controlling the game itself (sound effects, moving objects around, etcetera) rather than the time-intensive chore of scrolling an entire 32k screen around. You will be amazed to see how smoothly a HARDWARE-scrolled screen can move. Compare Those Darn Marbles with any other 3D marble type game on any computer, and you will be convinced that your CoCo 3 really can stand with the best of them. (One of our playtesters remarked, upon seeing the pre-release version of TDM: "My Amiga isn't that smooth!") 50k of multi-tasking sound, nearly 1 meg of graphics add excitement!

Our new 2-stage compression routine squeezes 1.1M onto 4 discs! It's been said many times, but this time it's true: Your CoCo 3 game library is not complete without a copy of Those Darn Marbles. Your 512k CoCo 3 never looked so good!

Price \$32 US / \$38 Cdn. Requires: 512k CoCo 3, 1 drive, joystick.



New!

Price: \$95 US/\$110 CDN (incl. software, demo samples, ADC pack)
 (Call for prices on 8-bit output, MIDI cable, SW Pro with just cable)
 Req.: 128k CoCo3, (512k rec'd), multi-pak/Y-cable, mouse/joystick

Come and
 see us at
 Rainbowfest
 Chicago!

Oblique Triad

32 Church St., Georgetown, Ontario, CANADA, L7G 2A7
 (416) 877-8149

We accept: MasterCard, Amex, Personal cheques and Money Orders.
 COD in Canada only. Please add \$2.50 shipping to all software orders,
 \$1 to all book-only orders. Ontario residents please add 8% tax.
 Call or write for a free catalogue.


```

BY THE SCREEN.
115 B = 129: C = 256 * FLAGS NO
SETTING OF TRACKS/SECTORS (FOR
SUBS 400 & 450)
120 CLS "RESET THE SCREEN
130 PRINT STRING$(10,K$) "disk"
K$ "editor" STRING$(11,K$);
140 PRINT " <1> SET TRACK/SECTO
R NUMBERS": PRINT " <2> EDIT BY
TES DISPLAYED": PRINT " <3> OUT
PUT SECTOR TO DISK"
150 PRINT "arrows" K$ "scroll" K
$ CHR$(124) K$ "clear" K$ "flips
" K$ "mode";
170 POKE 65496,0: EXEC44539: I$
= INKEY$: A = VAL(I$) "CANCEL
SPEED POKE. HOLD THE SCREEN.
I$ AND 'A' HOLD SELECTION.
180 IF I$ = CHR$(94) THEN 400 '
UP ARROW SELECTED.
190 IF I$ = CHR$(10) THEN 450 '
DOWN ARROW SELECTED.
195 IF I$ = CHR$(12) THEN 230 '
TOGGLE DISPLAY MODE SELECTED.
200 IF A < 1 OR A > 3 THEN 120 '
OPTIONS 1 TO 3 OR INVALID KEY.
210 ON A GOTO 300,500,600
220 '
230 IF F = 0 THEN F = 1 ELSE F =
0 "TOGGLE DISPLAY MODE FLAG.
240 PRINT @ 192, STRING$(128,32)
STRING$(128,32) STRING$(63,32);
' CLEAR THE DISPLAY AREA.
250 GOTO 350 'RE-DRAW SCREEN IN
NEW MODE.
260 '

```

```

270 ' DISPLAY TRACK & SECTOR
275 '
280 PRINT @ 160, " " S$:: PRINT
@ 162, "TRACK" C$ T::PRINT @ 17
6, "SECTOR" C$ S:: RETURN
290 '
300 ' DISK SCANNING SUBROUTINE
310 '
315 PRINT @ 160, STRING$(255,32)
STRING$(96,32); 'CLEAR WORKING
AREA.
320 PRINT @ 162,"TRACK" C$:: INP
UT I$: T = VAL(I$): IF I$ = "" T
HEN 120 ' INPUT TRACK NUMBER OR
NULL TO CANCEL.
330 PRINT @ 176,"SECTOR" C$:: IN
PUT I$: S = VAL(I$): IF I$ = ""
THEN 120 ' INPUT SECTOR NUMBER
OR NULL TO CANCEL.
350 IF S < 1 THEN S = 18: T = T
- 1 ELSE IF S > 18 THEN S = 1: T
= T + 1 ' ALLOWS SCROLLING TO
THE NEXT TRACK.
355 IF T < 0 THEN T = 0 ELSE IF
T > 34 THEN T = 34 ' ERROR TRAP;
40/80 TRACK USERS EDIT TO SUIT.
357 GOSUB 270 ' RE-PRINT TRACK &
SECTOR NUMBERS.
360 DSKI$0,T,S,X$,Y$ 'SECTOR IS
ACCESSED FROM DISK. 128 BYTES
AS X$ AND 128 BYTES AS Y$.
365 B = 1: C = 0: D = 0: Z$ = X$
: V$ = X$ 'RESET SEGMENT/BYTE
COUNTERS & MAKE V$ & Z$ = THE
FIRST INPUT VARIABLE.
370 POKE 65497,0 'SET FAST SPEED

```

```

371 A = INSTR(V$,CHR$(13)): IF A
<> 0 THEN MID$(V$,A,1) = " ": G
OTO 371 'MAKE ALL CR'S (13) INTO
A SPACE TO FORCE DISPLAY TO 2
LINES OF SCREEN.
372 IF F = 0 THEN 700 'GOTO SCAN
MODE ROUTINE.
373 PRINT @ 192, S$S$ 'CLEARS 2
LINES OF SCREEN.
374 PRINT @ 192, MID$(V$,B,64);
' PRINT A 64-BYTE SEGMENT.
375 PRINT @ 288,:: FOR X = C TO
C + 7: PRINT LEFT$(STR$(X)+ " ",
4);: NEXT X 'PRINT BYTE NUMBERS
380 FOR X = C+1-D TO C+8-D: PRIN
T LEFT$(STR$(ASC(MID$(Z$,X)))+ "
",4);: NEXT X ' PRINT THE VALUE
OF 8 BYTES.
383 A=352: FOR X = C+1-D TO C+8-
D: PRINT @ A, " "+MID$(V$,X,1)+
":: A = A + 4: NEXT X 'PRINT
ASCII CHAR. OF 8 BYTES.
385 C = X-1+D 'SET C FOR NEXT 8.
390 PRINT @ 416,:: FOR X = C TO
C + 7: PRINT LEFT$(STR$(X)+ " ",
4);: NEXT X 'PRINT NEXT 8 NUMS.
395 FOR X = C+1-D TO C+8-D: PRIN
T LEFT$(STR$(ASC(MID$(Z$,X)))+ "
",4);: NEXT X 'PRINT VALUE OF
8 MORE BYTES.
396 A = 480: FOR X = C+1-D TO C+
7-D: PRINT @ A, " "+MID$(V$,X,1)
+" ":: A = A + 4: NEXT X: PRINT
@ A, " " MID$(V$,X,1) " ":: X = X
+ 1 ' PRINT LAST 8 ASCII CHAR.
BYTES.

```

Super Controller II

UNDER OS-9: Buffered read/write sector achieved without halting the CPU means no loss of time or keyboard strokes. Mini Expansion Bus for 1 Super Add-On. One DOS included. **\$105**

Super Controller I

- Sockets for 4 DOSes
- Mini Expansion Bus for 1 Super Add-On. **\$80**

Mini Controller I

- Lowest Price Anywhere!
- Sockets for 2 DOSes **\$65**

NEW! From Rainbow's author, Tony DiStefano:

"A Full Turn of the Screw"

The complete collection of "Turn of the Screw" articles from Jan '83 to Jul '89. **\$15**

DISTO *HOT* SUMMER SALE!

NEW! GET 1 MEG

Of memory in your COCO 3 with DISTO's
1 MEG Upgrade Kit.

- Requires a 512K COCO 3 and soldering experience.
- Kit includes 512K mem and all necessary hardware.
- OS9 Drivers, by Kevin Darling, included.
- Compatible with DANOSOFT's software.
- Works with OBLIQUE TRIAD's "Studio Works",
- AND more to come! Ask your favorite software dealer to support the 1 meg COCO 3.
- Zero K Kit \$120.

ONLY \$150

• 512K Upgrade \$65

- YOU GET!**
- 120ns Prime DRAM memory chips.
 - FREE SOFTWARE included.
 - 1 FULL YEAR limited Warranty.
- Zero K Board \$25.**

4IN1 Multi-Board Adapter
Hard Disk, Real Time Clock
Serial & Parallel Ports. **\$100**

3IN1 Multi-Board Adapter
Real Time Clock, Serial &
Parallel Printer Ports. **\$65**

RTC & Printer Interface
Rtime & Parallel Port. **\$35**

MPROM Adapter
EPROM Programmer. **\$45**

HDisk Adapter + RS-232
SCSI / SASI & RS-232 **\$50**

Hard Disk Adapter \$40

RS-232 Adapter \$34

MEB II
A carrier for add ons. **\$25**

RS-232 PAK \$55

RGB to MONO
Monochrome video &
Audio adapter. **\$30**

Project Board \$10

Serial to Parallel
Converter **\$40**

CRC Inc.

11 Boul. Des Laurentides, Laval, Quebec, Canada H7G 2S3
Include S&H of \$4 or \$8 if order exceeds \$65 MC/Visa Accepted

1-514-967-0195
Sorry: No personal cheques


```

397 C = X-1+D: IF F1 = 1 THEN RE
TURN ELSE 170 'UPDATE COUNT.
RETURN IF EDIT FLAG SET. ELSE
GOTO MENU.
399 '
400 ' UP ARROW SUB
410 '
420 IF F = 0 OR C = 256 THEN S =
S + 1: GOTO 350 ' INCREMENTS TO
THE NEXT SECTOR.
425 POKE 65497,0 'SPEED POKE
430 IF C = 128 THEN B = 1: D = 1
28: Z$ = Y$: V$ = Y$: GOTO 370 '
ADVANCE TO NEXT INPUT VARIABLE.
440 IF C = 64 OR C = 192 THEN B
= B + 64: GOTO 370 'DISPLAY NEXT
64-BYTE SEGMENT AND NEXT 16
BYTE VALUES.
445 GOTO 375 'DISPLAY NEXT 16
BYTE VALUES.
450 ' DOWN ARROW SUB
455 '
460 IF F = 0 THEN S = S - 1: GOT
O 350 ' DECREMENTS SECTOR SCAN.
465 IF C = 16 THEN C = 240: D =
128: B = 65: S = S - 1: A = 255:
IF S < 1 THEN S = 18: T = T - 1
: IF T < 0 THEN T = 0 ' SHIFT
DOWN TO NEXT SECTOR. ("A" FLAGS
NEXT LINE.)
467 IF A = 255 THEN GOSUB 270: D
SKI$0,I,S,X$,Y$: Z$ = Y$: V$ = Y
$: GOTO 370 ' PRINT TK & SECTOR
AND GET NEXT SECTOR DOWN.
469 POKE65497,0 ' SPEED POKE
470 IF C = 144 THEN B = 65: C =

```

```

112: D = 0: Z$ = X$: V$ = X$: GO
TO 370 ' SHIFT DOWN TO IST INPUT
VARIABLE.
475 IF C = 80 OR C = 208 THEN B
= B - 64: C = C - 32: GOTO 370 '
DOWN BY ONE 64-BYTE SEGMENT.
480 C = C - 32: GOTO 375 'PRINT
NEXT 16 BYTES DOWN.
490 '
500 ' EDIT BYTES SUB
505 '
510 POKE 65496,0: IF F = 0 THEN
650 ELSE PRINT @ 162, S$: PRINT
@ 160, "byte" K$ "number" C$;: I
NPUT I$: A = VAL (I$) ' CANCEL
SPEED POKE. SELECT BYTE.
515 IF I$ = "" OR A < C - 16 OR
A => C THEN F1 = 0: GOSUB 270: G
OTO 170 ' EXITS EDIT OPTION.
520 PRINT @ 180, "value" C$;: IN
PUT I$: E = VAL(I$) 'DECIMAL
VALUE OF BYTE. IF E < 0 OR E > 255
THEN 120
525 IF I$ = "" OR E < 0 OR E > 255
THEN F1 = 0: GOSUB 270: GOTO 17
0 ' EXITS EDIT OPTION.
530 MID$(Z$,A+1-D,1) = CHR$(E) '
CHANGE THE BYTE.
540 V$ = Z$: IF C < 129 THEN X$
= Z$ ELSE Y$ = Z$ 'COPY CHANGE
TO I/O VARIABLES.
550 C = C - 16 'RESET BYTE COUNT
560 F1 = 1: GOSUB 370 'SET FLAG
FOR SUB AT 370 AND RE-DRAW THE
DISPLAY.
570 GOTO 510 'READY TO EDIT NEXT

```

```

BYTE.
590 '
600 'SUB TO WRITE SECTOR TO DISK
603 '
604 IF X$ = "" THEN 120 ' ERROR
TRAP. NO SECTOR IN MEMORY.
605 PRINT @ 192, STRING$(191,32)
STRING$(128,32); 'CLEAR WORKING
AREA.
610 PRINT @ 258, "modifying" K$
"disk SURE? (Y/N)": EXEC44539:
I$ = INKEY$: IF I$ <> "Y" THEN
650 ' WARNING MESSAGE.
620 DSK0$0.T,S,X$,Y$ ' SECTOR IS
WRITTEN TO DISK.
650 IF F = 0 THEN V$ = Z$ ELSE C
= C - 16 ' IF FULL SECTOR MODE
RESET DISPLAY VARIABLE ELSE
RESET THE COUNT IN BYTE MODE.
660 PRINT @ 256, S$: GOTO 370 '
RE-DISPLAY SCREEN.
690 '
700 'SCAN ENTIRE 256-BYTE SECTOR
705 '
710 PRINT @ 192, S$S$S$S$S$S$S$
$: 'CLEAR 8 LINES ON SCREEN.
720 PRINT @ 192, V$: 'PRINT 128
BYTES OF SECTOR.
730 V$ = Y$ 'GET NEXT SEGMENT
740 A = INSTR(V$,CHR$(13)): IF A
<> 0 THEN MID$(V$,A,1) = " ": G
OTO 740 'REPLACE THE CR'S.
750 PRINT V$;: GOTO 170 'PRINT
LAST 128 BYTES & BACK TO MENU.

```



ORIGINAL DUAL HI-RES Colorware Hi-Res
Tandy Hi + Low Res, cassette jack.

ECONOMY HI & LO-RES Tandy Hi + Lo-Res

DUAL HI-RES \$40 HI & LO-RES **\$27**

HAWKSoft keyboard extend cable \$25
DOMINATION "risk"-like war game \$18
MYDOS the extended DOS for you! \$15

HAWKSoft P.O. Box 7112 Elgin, IL 60121
(708) 742-3084 eves and ends
SASE for more info and price list.
S/H (US & CAN) always included
M.O. Check C.O.D. (no credit cards yet)
1 year warranty on ALL hardware !!

NEW FOR OS-9 LEVEL II

The labeling package OS-9 users have been waiting for. You can edit a label up to 5.5" X 8".

You can print: disk labels, cassette labels, rolodex cards, standard address labels, VCR labels, invitations, letter heads, and envelopes complete with return address.

You can use any printer currently configured to your system. The same goes for your disk drives

Includes a complete database with files of any size. Any field can be merged into the label.

10 programmable printer fonts.

You can have disk files of any size.

NOW AT AN INTRODUCTORY PRICE OF \$14.95

Send Check or Money Order to:

Constellation Computer Consultants
P.O. Box 423
Sanford, Me
04073

Main residents add 5% sales tax.
Add \$2.00 S/H No COD's.

*A utility to switch window
types in a hurry*

Type Does Windows!

by Chris Swinefurth

Have you ever been using a text window and needed to change to a graphics window to run your favorite graphics editor, but you didn't have a hard drive and the makegw file was on another disk? Even with a hard drive you probably don't like files cluttering up your root directory, you just *hate* to change directories, and you're tired of shell scripts that only change the window to one type. Perhaps you need *Type*, which I created in order to change the type of window selected — i.e., a graphics window, or a 40- or 80-column text window.

Type uses the following syntax:

`type [-opts]`

where the options are as follows:

Chris Swinefurth is 14 years old and is a self-taught programmer in C and BASIC. He may be contacted at R.R. 3 Box 321, Elwood, IN 46036 (317) 552-5707.

OS-9 Level II

The Listing: type.c

```
/* Type - A utility to change the type of window you're in.
   By: The Bug (Chris Swinefurth)
      R.R 3 Box 321
      Elwood, IN 46036

   (c)December 30,1989 Chris Swinefurth

   Version - 7
*/
#define ON      1
#define OFF     0

#define gcode(i) gp = gbuf; gbyte(0x1B); gbyte(i)
#define gbyte(i) *(gp++) = ((char) i)
#define gwrite() write(1, gbuf, gp-gbuf)

/* Main Variables */
char gbuf[15];
char *gp;
int i;
int type;
int foreground = -1;
int background = -1;
int border = -1;
char cols[] = {0, 40, 80, 38, 80, 80, 40, 80, 40};
char label = OFF;

/* — Start of Main — */
```


- t window type
- f foreground color
- b background color
- o border color
- l window label

Note that you must include the -t parameter and provide the desired window type number (see Table 1.) For example, if you want to create an 80-column text window with a foreground palette of zero (white), a background palette of one (blue), and a border palette of two (black), you would enter type -t2 -f0 -b1 -o2. You can put the -l option after the window type number: type -t# -l (where the # indicates the window type number). This option tells Type to label the window. Use this option if you want a label on the window and you have the label command, which is available on Delphi.

Window types 1, 2 and 5 through 8 are the standard OS-9 window types. Window Type 3 is a 38-column window for people without an 80- or 40-column monitor (yes, I've been there myself). Window Type 4 is a 106-column window, which is really a Type 7 window, but I used the smaller

```
main(argc, argv)
int  argc;
char *argv[];
{
    /* Test for Arg's */
    if(argc < 2)
        help();

    /* Loop to get Arg's */
    /* This loop allows it to put the arg's any way they want! */
    while(--argc > 0 && (++argv)[0] != '-') {
        for(gp = argv[0] + 1; *gp != '\0'; gp++) {
            switch(*gp) {
                case 'b':
                    background = atoi(++gp);
                    break;

                case 'f':
                    foreground = atoi(++gp);
                    break;

                case 'l':
                    label = ON;
                    break;

                case 'o':
                    border = atoi(++gp);
                    break;

                case 't':
                    type = atoi(++gp);
                    if(type == 4) {
```

Call for
package price

ACCOUNTING SYSTEMS

SMALL BUSINESS ACCOUNTING

This sales-based accounting package is designed for the non-accountant oriented businessman. It also contains the flexibility for the accounting oriented user to set up a double entry journal with an almost unlimited chart of accounts. Includes Sales Entry, transaction driven Accounts Receivable and Accounts Payable, Journal Entry, Payroll Disbursement, and Record Maintenance programs. System outputs include Balance Sheet, Income Statement, Customer and Vendor status Reports, Accounts Receivable and Payable Aging Reports, Check Register, Sales Reports, Account Status Lists, and a Journal Posting List.

\$79.95

INVENTORY CONTROL/SALES ANALYSIS

This module is designed to handle inventory control, with user defined product codes, and produce a detailed analysis of the business' sales and the sales force. One may enter/update inventory data, enter sales, run five sales analysis reports, run five inventory reports, set up product codes, enter/update salesman records, and update the SBAP inventory.

\$59.95

PAYROLL

Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware.

\$59.95

PERSONAL BOOKKEEPING 2000

Handles 45 accounts. Enters cash expenses as easily as checks. Handles 26 expense categories. Menu driven and user friendly.

\$39.95

ACCOUNTS RECEIVABLE

Includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package.

\$59.95

ACCOUNTS PAYABLE

Designed for the maintenance of vendor and A/P invoice files. The system prints checks, voids checks, cancels checks, deletes cancelled checks, and deletes paid A/P invoices. The user can run a Vendor List, Vendor Status report, Vendor Aged report, and an A/P Check Register. This package can be used either as a standalone A/P system or can be integrated with the Small Business Accounting Package.

\$59.95

**MICROTECH
CONSULTANTS
INC.**

1906 Jerrold Avenue
St. Paul, MN 55112

Dealer Inquiries Invited
Author Submissions accepted
OS-9 is a trademark of Microware



Ordering Information

Add \$3.00 shipping & handling. MN residents add 6% sales tax.
Visa, Mastercard, COD (add \$3.50), personal checks.

(612) 633-6161

graphics font. Window Type 4 can be used for super text resolution with graphics or just to show off OS-9.

If you give the program a window type of 0, it changes the window to the default defined in the device descriptor — but only if you initialized the window via the `iniz` command. If the window was not initialized, it will be destroyed. At this point you need to `iniz` the window and run `type` with the program's standard output redirected to the window you destroyed. Also, never run the program while you are in the VDG 32-column window.

I use the program in my OS-9 startup file to change the default 40-column window to an 80-column window.

The Program

First, *Type* gets the command line arguments by using a while/switch loop and checks them for validity. If the arguments are correct, the window is destroyed by using the `DWEnd` (\$1B 24) call and recreated by using the `DWSet` (\$1B 20) call. For safety, the window is selected by using the `OS-9 Select` (\$1B 21) call.

Not only does *Type* change the kind of window you are currently in, you can also redirect its output to a different window and make that window whatever kind you want. For instance, I use the program in my OS-9 startup file to change the default 40-column window (Type 1) to an 80-column window (Type 2).

The feature I like most about OS-9 is windows. I hope everyone can learn from this program. I think you should try windows at least once before concluding that OS-9 is too difficult to use.

```

        type = 7;
        cols[0] = 1;
    }
    break;

case '?':
default:
    help();
    break;
}
}

/* Test window type */
if(type < 0 || type > 8)
    help();

/* Call to Dwset to make window - dwset also dwends the window */
dwset();

/* Call to font - it doesn't hurt a text window to call font so to */
/* save mem I went ahead and called it for every */
/* window you make. */
gcode(0x3A); /* Font Call */
gbyte(0xC8); /* Font Buffer - Defined by: Microware */
gbyte(cols[0] ? 2 : 1); /* Small Font for Type#4 - Reg Font for rest */
*/
gwrite();

/* Test for Label */
if(label)
    system("label");
}
/* — End of Main — */

/* dwset call - all args are external so no function args */
dwset()
{
    gcode(0x24); /* dwend call */
    gwrite(); /* write it */
    gcode(0x20); /* dwset call */
    gbyte(type == 3 ? 1 : type); /* type of the window */
    gbyte(type == 3 ? 2 : 0); /* 2 cols for 38 col window - 0 for rest */
*/
    gbyte(0); /* 0 down */
    gbyte(cols[type]); /* columns for the window */
    gbyte(24); /* columns down */
    gbyte(foreground == -1 ? 0 : foreground);
    gbyte(background == -1 ? (type == 5 ? 1 : 2) : background);
    gbyte(border == -1 ? (type == 5 ? 1 : 2) : border);
    gbyte(0x1B); /* Escape Sequence - Adding on to buffer */
*/
    gbyte(0x21); /* Don't forget to select the window */
    gwrite(); /* Write it all */
}

char *helpmsg[] = {
    "type -t# {-f#} {-b#} {-o#} {-l}\n",
    "-t# = window type (0-8)\n",
    "-f# = foreground color\n",
    "-b# = background color\n",
    "-o# = border color\n",
    "-l = label the window\n"
};

help()
{
    int i;

    for(i = 0; i < 6; i++)
        writeln(2, helpmsg[i], strlen(helpmsg[i]));
    exit(0);
}

```


CoCos Not up to Par

by Marty Goodman.
Contributing Editor

I have a CoCo 3 that gives only a blank screen when the power is turned on. No startup logo ever appears. I also have a CoCo 2 that is dead. What do you think is wrong with these machines?

Randy Praster
South Bound Brook, New Jersey

It is impossible for me to be sure of what is wrong with either of those computers without testing. However, I can speculate that the CoCo 3 has a dead 68B09E chip. Out of the last six CoCo 3s I've fixed, four had fried 68B09E chips.

You need to be able to desolder this 40-pin chip without hurting the delicate traces on the circuit board, install a socket, then install a replacement 68B09E if you want to fix the machine. Don't attempt this unless you have experience with desoldering chips and delicate soldering in general.

Other problems that can plague CoCo 3s include bad GIME chips (the socketted square chip) and bad memory chips. I've seen CoCo 3s with burned-out keyboard PIA chips causing exactly the same problem you describe. Both of those were on CoCo 3s that had my custom keyboard extender cable on them, where the owners (myself in one case) played around with hooking different keyboards to that cable and managed to zap the chip with a static discharge.

As for the CoCo 2, anything could be wrong with it. Common CoCo 2 problems include dead SAM chips (74LS783 or 74LS785), dead 6809Es, bad memory chips or any combination of the above. Typically repairs on those are done by chip swapping. Note that CoCo 2s tend to sell for \$25 or less at flea markets these days, and so spending much time or money repairing them is often not worth it.

Deciding on a Disk Drive

I'm ready to buy a disk drive for my CoCo 3 but wonder whether to get a 3½-inch or a 5¼-inch floppy drive. As I understand it, I can use the 3½-inch drive with normal Radio Shack Disk BASIC but will only be using the first 35 tracks on only one side. Is this so? How

can I use more of such a disk drive? What is meant by "Drive 0" and "Drive 1"?

Syd Tash
Quebec

Yes, electrically the 3½-inch floppy disk drives can be hooked directly to a Tandy-style CoCo disk controller. All you need is a different type of 34-pin connector. And you are right in observing that with unmodified Radio Shack Disk Extended Color BASIC, you can only access under a quarter of the total disk storage space available on such a disk. However, with ADOS3 or with some programs from Danosoft, you can modify Disk BASIC to work with 80-track and double-sided drives. The problem you will have is that most CoCo software is supplied only on 5¼-inch disks. So when you buy software or exchange information with other CoCo owners, you will have a problem. This can be solved by buying both a 3½-inch drive and a 5¼-inch drive and hooking both into the system. Extended ADOS3 supports such an arrangement.

The terms Drive 0 and Drive 1 refer to different devices accessed by Disk BASIC. Often these different devices are actually two physically different disk drives. However, under ADOS and other modified DOSSs, one often assigns one side of a double-sided disk to be one device and the other side of it to be another device. For example, most folks with two floppy disk drives under Disk BASIC set things up so that Side 0 of their first drive is Drive 0 and Side 1 of their first drive is Drive 2, with Drive 1 and Drive 3 corresponding to the 0 and 1 side of their second physical drive, respectively.

Both the 3½-inch and the 5¼-inch drives you are referring to are floppy drives. A hard drive is an entirely different animal. The disks for the 3½-inch drives are in more rigid plastic sleeves than the sleeves used to hold 5¼-inch disks. But inside those plastic sleeves on a 3½-inch disk is the same floppy mylar disk material used in a 5¼-inch disk.

Idea for Chip Extractor

I've found that I can make a GIME Chip Extractor using the common, inexpensive, U-shaped IC extractors. What I did was file down the grabbing ends of an ordinary IC extractor until they were roughly 1/8 of an inch wide instead of their usual 1/4-inch width. Because the ends are small, they can fit into the diagonally opposite corner spaces between the GIME chip and its socket, making for easy extraction.

Robert Capone
Reading, Pennsylvania

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator—sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

**GET 'EM WHILE
THEY'RE
STILL HOT**

For greater convenience, order through the Rainbow Magazine Services area of our Delphi CoCo SIG.

VOLUME 9		
AUG 89	Beyond BASIC	\$3.95
SEP 89	Education	\$3.95
OCT 89	Graphics	\$3.95
NOV 89	Data Comm.	\$3.95
DEC 89	Holiday	\$3.95
JAN 90	Beginners	\$3.95
FEB 90	Home Help	\$3.95
MAR 90	Hardware	\$3.95
APR 90	Business	\$3.95
MAY 90	Printer	\$3.95

That's a neat, clever tool you've constructed. It should work quite well. I've always managed to extract GIME chips using two jeweler's screwdrivers at opposite corners and gently levering up the chip.

CoCo 3 owners who need to remove their GIME chip should make careful note of the exact orientation of the chip before they remove it. It is not keyed, and it is possible to insert it rotated 90, 180 or 270 degrees.

Expansion Port Pin-Out

Can you give me the pin-out of the Color Computer's expansion port? I'm interested in building some of Tony DiStefano's projects described in his "Turn of the Screw" column.

*Chris Long
Lapeer, Michigan*

Below is a pin diagram for the Color Computer expansion port:

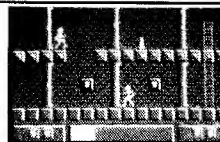
Pin	Function	Pin	Function
1	NC	21	A2
2	NC	22	A3
3	*HALT	23	A4
4	*NMI	24	A5
5	*RESET	25	A6
6	ECLK	26	A7
7	QCLK	27	A8
8	*CART	28	A9
9	+5 volts	29	A10
10	D0	30	A11
11	D1	31	A12
12	D2	32	*CTS
13	D3	33	Ground
14	D4	34	Ground
15	D5	35	SND
16	D6	36	*SCS
17	D7	37	A13
18	R/*W	38	A14
19	A0	39	A15
20	A1	40	*SLENB

Note that this information plus a full schematic diagram for the CoCo is available in the service manual for the Color Computer. I suggest that anyone doing hardware projects for the CoCo have this manual on-hand for their CoCo model. Also note that pins 1 and 2 carry minus (-) and plus (+) 12 volts, respectively, on the port of the CoCo 1 and on the 40-pin connector of both the old and newer Multi-Pak Interfaces. NC above means not connected to anything.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form, which has complete instructions.



BARBARIAN QUEST

Save your bride to be from the horrors of the evil Luthor's domain! Screen after screen of beautiful graphics and exciting arcade action with fully animated characters. Great digitized sound. Walk, run, jump, climb and fight your way to victory against a host of Luthor's vile cohorts. Game includes an optional continue feature that allows you to keep playing even if you loose! Set your own level of stress! It's great arcade action! Requires 512K and 1 disk drive. ONLY \$34



THE SUPER DISK

Never before have so many powerful disk utilities been assembled in one package. The manual contains NEVER BEFORE PUBLISHED information about copy protection techniques and the disk has ALL of the utilities you need to use that information. If you are an author, this is a MUST HAVE package! If you just like to SNOOP, this disk has everything you need to read & write any part of a disk, even the data you were not meant to see! If you want to create copy protected disks or copy your valuable originals, THE SUPER DISK is for you! JUST \$39



WARGAME DESIGNER II

WGD II is a complete graphic oriented war game design system. Create your own graphic icons for units and terrain features. Design your own maps. Assign each unit it's own unique attributes. Then play the games you want to, the ones YOU designed. It's easy. All modules are menu driven, no programming knowledge required. Comes complete with manual, 2 floppy disks and 4 ready to play scenarios. ONLY \$29

WARGAME DESIGNER ICON DISK

This disk contains hundreds of ready to use icons for units and terrain features. Save hours of design time. Just transfer these icons to your WGD II game disk (automatically from menu) and you're ready to design a new scenario. A real bargain at just \$15



WEEKLY WINNER 3.0

Recently updated, WW 3.0 now handles 3,4,5,6 and 7 digit lottos. We've personally seen it pick 4 and 5 out of 6 in the Ohio SUPER LOTTO and have had reports of winnings from users in other parts of the US. Enhance YOUR chance! Invest in WEEKLY WINNER 3 today ONLY \$15



COCO 3 FLAGS

This is the BEST "RISK" play alike available for the COCO 3. Screen shows the entire world and zooms in on the area you choose. For 1 to 6 players. It's great entertainment for a mere \$21



COCO 3 WHEEL

Outstanding party fun of 1 to 6 players! You can even design your own word puzzles. ONLY \$21



VOCAB

If you like SCRABBLE, you'll love VOCAB. It even includes a family of computer opponents. For 1 to 6 players. JUST \$21

1990 CATALOG

Have you got your copy of our NEW 1990 fully illustrated 16 page catalog yet? It explains in full detail each of the programs above plus many more fine entertainment and productivity programs for your COCO 3 disk system. Send your name and address and \$2.00 and we'll RUSH your copy to you at once. You'll also get DISCOUNT COUPONS worth \$30.00 FREE with the catalog! Get your's Today.

All orders are shipped via first class mail within 24 hours of receipt. We accept VISA, MASTERCARD, MONEY ORDERS, PERSONAL CHECKS and COD orders. COD's add \$3.00. Phone or mail your order in today!

SPORTSware

1251 South Reynolds Road, Suite 414 • Toledo, Ohio 43615
(419) 389-1515

SUPER

We've slashed prices on the popular Color Computer *plus* your favorite software and accessories.

COLOR COMPUTER

SALE!

SAVE
\$70

SALE
ENDS ON
JUNE 16!



Color Computer 3[®]

ONLY **129⁹⁵** Reg. **199.95**

128K Extended BASIC. The perfect family computer for graphics, programming, budgeting, word processing, and much more. Connect to your TV or the high-res CM-8 color monitor. #26-3334

POPULAR ENTERTAINMENT SOFTWARE

SAVE
\$15

ROBOCOP

19⁹⁵ Reg. **34.95**

Robocop. Welcome to the future of law enforcement. Meet Robocop: he's part man, part machine—and all cop. Get ready for non-stop action in this explosive game. There's a crime being committed somewhere, and it's up to you to stop it—any way you can. #26-3164

Arkanoid. Non-stop space action. 33 screens of arcade-quality graphics. Survive, if you can! Reg. **\$34.95.** #26-3043

Shanghai. Face the captivating challenge of this ancient Chinese strategy game. Reg. **\$24.95.** #26-3084

Mind-Roll. Enter a dimension beyond infinity—test your physical and mental excellence. Reg. **\$34.95.** #26-3100

SALE PRICED FROM

9⁹⁵ to 19⁹⁵!

Reg. 19.95 to 34.95

SAVE \$10 to \$15!

Rad Warrior. The year is 2086 A.D. The place—Earth. Aliens have invaded, and they're out to wipe out humankind. As Tal, warrior of the future, can you save the world from destruction? Reg. **\$29.95.** #26-3162

Predator. Welcome to the jungle. As Major "Dutch" Shaefer, you must face the merciless space alien in this struggle for survival! 30 stages of action! Reg. **\$34.95.** #26-3165

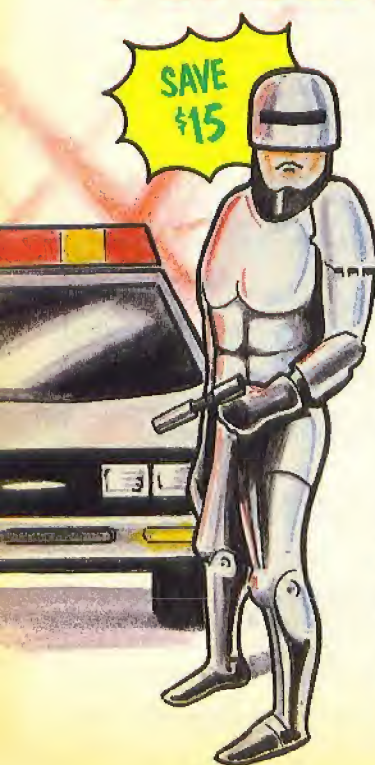
19⁹⁵

9⁹⁵

19⁹⁵

19⁹⁵

19⁹⁵





\$80 OFF!

ONLY **DC Modem Pak**

An unbelievable low price! Transfer/receive ASCII files or access information services. #26-2228

9⁹⁵

Reg. 89.95



HALF PRICE!

NOW! **2-Button Mouse**

Simply "roll" mouse across tabletop to position cursor quickly. Two buttons for multiple functions. #26-3125

24⁹⁵

Reg. 49.95



SAVE OVER 50%

WOW! **Dual Joysticks**

Have twice the fun! Fast 360° movement. Single-shot button. Two-player action! #26-3008

9⁹⁵

Reg. 19.95



SAVE \$100

WOW! 199⁹⁵

Reg. 299.95

SUPER! CM-8 Color Monitor

80 x 24 text, 640 x 192 high-resolution graphics. #26-3215



SAVE \$120

NOW! 179⁹⁵

Reg. 299.95

Color Thinline Disk Drive

Turn your Extended BASIC color computer into a disk system! #26-3133



HOLDS DISK DRIVE, TOO!!

19⁹⁵

Monitor Platform

Elevates monitor for easy viewing. Molded plastic. Easy to assemble. 47^{1/8} x 20^{15/16} x 12". #26-1329

INCREDIBLE SOFTWARE SAVINGS!

ALL COCO ROM PAKS

33% OFF!

ALL COCO DISK SOFTWARE

40% OFF!

CREATING NEW STANDARDS

PROVEN LEADERSHIP

Over 7,000 USA locations, 39,000 employees, seven research and development centers, 31 USA and overseas manufacturing plants—NOBODY COMPARES!

RELIABLE QUALITY

Over 1,500 engineers and technicians develop, evaluate and test to our exacting standards that have evolved since 1921—NOBODY COMPARES!

GUARANTEED SATISFACTION

Over 35 million customers benefit annually from our satisfaction guarantee. Putting you first has made us #1 in PC compatibles—NOBODY COMPARES!

Radio Shack®
AMERICA'S
TECHNOLOGY
STORE™

Prices apply at Radio Shack Computer Centers and participating stores and dealers. Radio Shack is a division of Tandy Corporation.

Scaling the Directory Tree

by Greg Law
Technical Editor

This is a continuation of last month's discussion, which covered in detail the basic structure of directories. As a follow-up, let's look at how the directories are linked. First, we'll create a sample disk.

With your OS-9 System Disk in the drive, type `load format dir mkdir` and press ENTER. Remove your system disk, insert a blank disk and type `format /d0`. When the disk has finished formatting, type `dir`. Nothing there, right? So far there is nothing on the disk except for an empty directory. This is called the root directory because it is the base, or foundation, from which other directories are built. Let's begin adding some directories by typing `mkdir CMDS` and `mkdir TEMP`, pressing ENTER after each command. Type `dir` again and see that we now have two directories on the disk. Enter `chd TEMP` to make TEMP the *current data directory* — the one in which we'll work next. If you enter `dir`, you'll see TEMP is currently empty. Now create two subdirectories within TEMP by entering `mkdir FILES` and `mkdir PWDIR`. Go ahead and make `/D0/TEMP/PWDIR` the current data directory by entering `chd PWDIR`.

Right now our directories are three levels deep. On the first level we have the root directory (`/D0`). The second level contains CMDS and TEMP, and the third level contains FILES and PWDIR. Figure 1 shows the directory layout as an organizational chart. The president is at the top, the various department heads are under him in the second level and the area supervisors are in the third level.

In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.

The Crumbs

Each directory on the disk has two special entries, dot-dot (`..`) and dot (`.`). Long ago someone in the UNIX world had the crazy idea that these two entries look like cookie crumbs. Needless to say, they've been called crumbs ever since. In order to take a closer look at these two entries, we'll need to modify the `files` program presented last month. Load `files.b09` into BASIC09 and delete everything from `SEEK #Drice_PN, Offset` through `NEXT Count`, and insert the following line in its place:

```
PRINT USING"S18,H2,H2,H2",File_name,Dir_Entry.LSN(0),Dir_Entry.LSN(1),Dir_Entry.LSN(2)
```

Turn your printer on and make sure it is online. From the BASIC09 prompt enter `chd /D0` and run `files >/p`. Now enter `chd TEMP` followed by `run files >/p` and `chd PWDIR` followed by `run files >/p`. If all goes well, you should have four entries in the root directory: dot-dot, dot, CMDS and TEMP.

The numbers printed to the right of each directory entry are logical sector numbers. The dot entry contains the logical sector number of the current directory, and the dot-dot entry contains the logical sector number of the parent directory.

Try this experiment. Type `save /d0/temp/files/files.b09` and exit BASIC09. Type `chd /D0/TEMP/FILES` followed by `dir`. If you type `dir .` you'll see a directory listing of the same directory. If you type `dir ..` you'll see a directory listing of the parent directory, `/D0/TEMP`. What would happen if you typed `dir ...`? Try it and you'll see a directory listing of the root directory, which is two levels up. Each dot represents one level up the chain. This is actually a shorthand method OS-9 allows you to use. In MS-DOS, `dir ...` would be `dir ../..` because MS-DOS doesn't recog-

nize the shorter sequence.

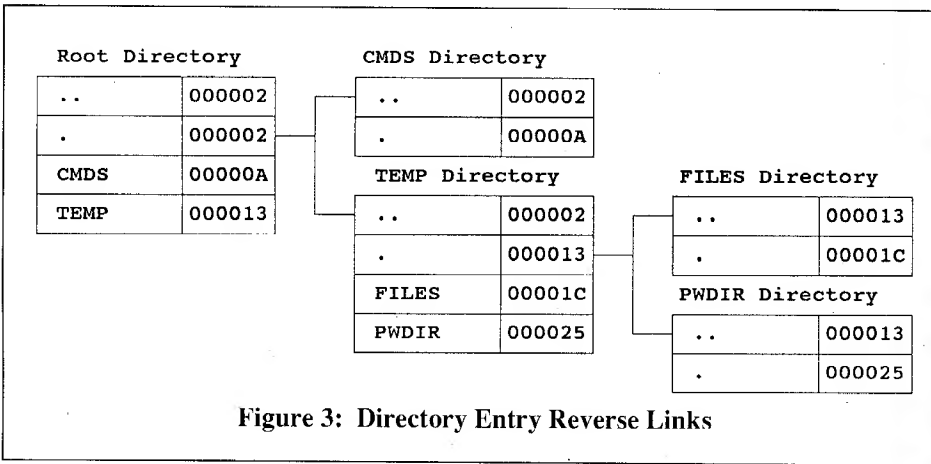
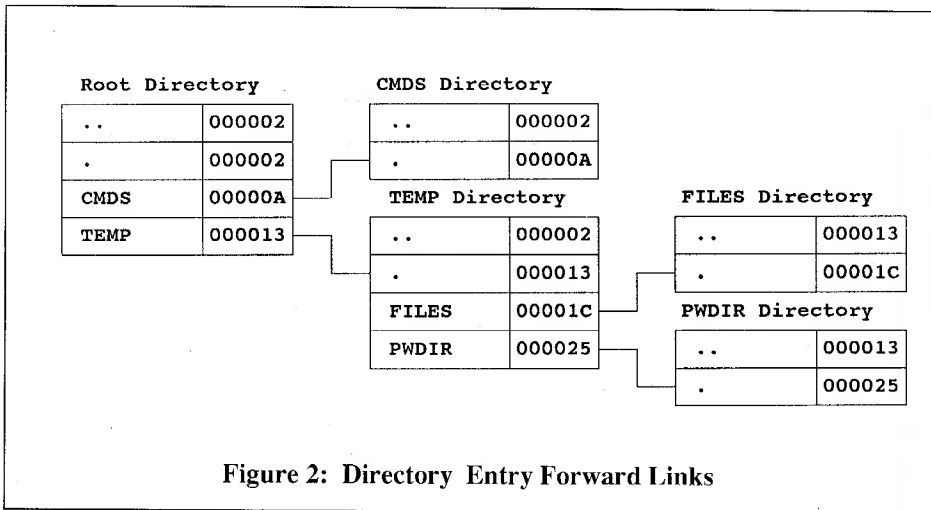
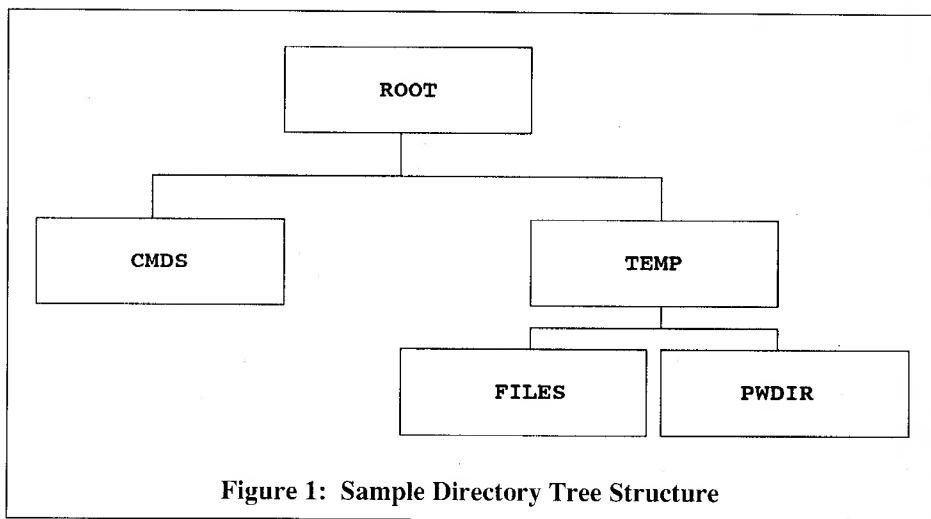
Refer to Figure 2 and you will see that, according to its entry in the root directory, the CMDS directory is located at LSN \$00000A and the dot entry in the CMDS directory is also LSN \$00000A. As the arrows indicate, the entries in the parent directory always match the dot entries in its own directory. Look at Figure 3; all the dot-dot entries contain the logical sector number of the parent directory. For example, the root directory is at LSN \$000002, and the dot-dot entries in both the CMDS and TEMP directories are LSN \$000002.

This is commonly called a *doubly-linked list*, meaning that each directory has both a forward link and a reverse link. As I've shown in the figures, the directory entries point forward to the dot entries of the subdirectory. Likewise, the dot-dot entries of the subdirectory point backward to the dot entry of the parent directory.

Following the Chain

So, how does OS-9 know where each directory is located? If you get lost in a tangle of directories, you can type `pwd` and OS-9 will tell you exactly which directory you are in, right down to the drive. Is OS-9 so smart that it can remember which directories you are moving around in? Actually, OS-9 has no idea which directory you are in so it goes looking to find out.

Presume for the moment that you are in the `/D0/TEMP/PWDIR` directory. The first step is to open the current directory and read the dot entry. According to the dot entry the current directory is located at LSN \$000025. The next step is to open the parent directory and read each entry until you find one that has \$000025 for the LSN value. When you find it you know the name of the current directory, which is PWDIR. To find the name of the parent directory read the dot entry in the parent directory. Then open the parent-parent directory and search



for the entry with the matching LSN value. Continue doing this, going one level up the chain each time.

How do you know when to stop? Look at the figures again. See anything obvious? Both the dot and dot-dot entries in the root directory have the same values for the logical sector number. They will never

SUPERSOUND

Record music, voice or sound effects for your programs or even CM3 graphics with non-stop animation & sound effects in only 128k. Even do a duet with yourself on two tracks. The best & only multi-tasking sound system & easiest of ALL to use! ALL our features work with only 128k but can use to 1meg or more memory. All sounds & variables saved on disk. Easy BASIC demos help get you started.

CoCo3, 128k, 1 disk **\$39.95**

SUPERSHOW, CoCo3, 128k, 1 disk **\$7.95**

SAY'N'SPELL

Let your CoCo3 help your children learn. Their spelling words in YOUR own voice, recorded & saved on disk. Easy to use & makes homework fun. Parent enters the words once & your CoCo will drill them all week, watch grades go up! Useable by children in 1st grade & up. Includes cable to record from cassette.

CoCo3, 128k, 1 disk. **\$19.95**

ULTRAED

The BEST CoCo3 assembler/disassembler available. Two work buffers, online help file & true source code disassembly makes this utility a must for the serious programmer. Supports 80 col. screen & full disk I/O. Requires EDTASM+ cart to make a working copy. By Randall Reid.

CoCo3, monitor, 128k, 1 disk **\$22.50**

COLOR GRAPHICS

All of our graphics print drivers offer: True RGB to CMY color conversion for a real What-You-See-Is-What-You-Get print, even ALL 4096 colors of RASCAN pictures. Offer ON-SCREEN color preview/editing. Rich colors with double the ribbon life. Prints for use in a 5x7 and/or 8x10 picture frame. Mirror prints that can be used for left/right pairs or make T-shirt transfers with proper L/R perspective. Partial screen printing for letterheads. Drop in a black ribbon for perfect B & W prints of full color graphics pictures!

RAS*MAX

Now print 4096 RASCAN color pictures in Photo sharp full color on a Star NX1000 Tandy DMP-240 or compatible color printer. Supports 16 color and B & W. RASCAN is not needed to print pictures. Prints 4096 & 16 color on CGP-220.

CoCo3, 128k, 1 disk, printer **\$19.95**

STAR*MAX

Print CM3, GIF, MGE or HSCREEN2 pictures on STAR NX1000 DMP-240/compatible printer. Double-screen pictures for 8x10 frames. Prints snapshot size in full color!

CoCo3, 128k, 1 disk, printer **\$19.95**

STAR NX1000 4 color ribbon **\$ 9.95**

Heat Transfer 4 color ribbon **\$12.95**

CGP*MAX

Print CM3, GIF, MGE, or HSCREEN2 pictures on CGP-220 or compatible, full color only!

CoCo3, 128k, 1 disk, printer **\$14.95**

PM*PRINT

PMODE3/4, 2 sizes, limited editing, NX1000, DMP-240, EPSON compatible(s). CoCo2/3, 32k, disk **\$14.95**

SUPERSOFT, INC

363 Oakwood Ave., Jackson, MI 49203
(517) 787-3610 \$2.50 S/H per order
Visa/M.C. Check, M.O., MI res add 4% sales tax

match in any other directory unless your disk has really been scrambled. Since the root directory begins the chain, it does not have a parent directory.

How do you open the current directory? In BASIC09 you would use the command `OPEN #Path,".":DIR+READ`. To open the parent directory you would use `OPEN #Path,"..":DIR+READ`. By the same token, you can open the parent's parent directory by using `OPEN #Path,"...":DIR+READ`. For each directory up the chain, append a single period to the filename. You can obtain the name of the disk descriptor by using the `SS.DevNm Get Status` call.

You might actually look at each directory as a simple structure. As such we have the physical directory entries themselves defined in C as follows:

```
typedef struct DIR_ENTRY {
    char Filename[29];
    char LSN[3];
};
```

Each directory contains an unspecified number of entries. There will be at least two entries (dot-dot and dot), but the maximum is limited only by the amount of disk space available. You can determine the maximum number of entries in a directory by obtaining the size of the directory and dividing by 32, which is the size of each entry. As such, a directory might be defined by the following structure, where `MAX_ENTRIES` is an arbitrary number:

```
struct Directory {
    DIR_ENTRY ParentDirectory;
    DIR_ENTRY CurrentDirectory;
    DIR_ENTRY
    Entries[MAX_ENTRIES];
};
```

The filenames may or may not use all 32 characters available. For this reason each filename is terminated by setting the most-significant bit in the last character of the filename. This is accomplished by ORing the last character with `$80` (decimal 128). Examine the `strncpy` routine presented last month for further details. If a directory entry is unused or if you delete a file, the first byte in the filename field will be zero.

The Listing

The majority of the work is performed by the `do/while` loop. The first step obtains the LSN values of the dot and dot-dot entries, closes the directory, appends a period to the filename, and opens whichever directory the name refers to. If we are not at the root directory, the name of the current directory is stored in an array.

The `Find_Offset()` function reads each

The Listing: `pwdir.c`

```
#include <os9.h>
#include <stdio.h>

#define _DIR 0x80
#define _READ 0x01
#define MAX_STACK 30

int StackPointer;
char stack[MAX_STACK][30];

struct {
    char FileName[29];
    char LSN[3];
} DirEntry;

main()
{
    int dir_pn;
    char dir_name[30];
    long dot_LSN;
    long dot_dot_LSN;

    long Find_Offset();
    char *Find_Name();

    StackPointer = 0;
    strcpy(dir_name, ".");

    if((dir_pn = open(dir_name, _DIR+_READ)) == EOF) {
        fprintf(stderr, "Cannot open current data directory.\n");
        exit(errno);
    }

    do {
        dot_LSN = Find_Offset(dir_pn, ".");
        dot_dot_LSN = Find_Offset(dir_pn, "..");
        close(dir_pn);
        strcat(dir_name, ".");

        if((dir_pn = open(dir_name, _DIR+_READ)) == EOF) {
            fprintf(stderr, "Cannot open directory \"%s\".\n", dir_name);
            exit(errno);
        }

        if(dot_LSN != dot_dot_LSN)
            Push(Find_Name(dir_pn, dot_LSN));
    } while(dot_LSN != dot_dot_LSN);

    Print_Pathlist(dir_pn);
}

long Find_Offset(dir_pn, name)
int dir_pn;
char *name;
{
    char filename[30];
    long offset;

    lseek(dir_pn, 0L, 0);

    while((read(dir_pn, &DirEntry, sizeof(DirEntry))) > 0) {
        strncpy(filename, DirEntry.FileName);
        l3tol(&offset, DirEntry.LSN, 1);

        if((strcmp(filename, name)) == 0)
            return(offset);
    }
    return(0L);
}

char *Find_Name(dir_pn, lsn)
int dir_pn;
long lsn;
{
    static char filename[30];
    long offset;

    lseek(dir_pn, 0L, 0);

    while((read(dir_pn, &DirEntry, sizeof(DirEntry))) > 0) {
        strncpy(filename, DirEntry.FileName);
        l3tol(&offset, DirEntry.LSN, 1);

        if(lsn == offset)
            return(filename);
    }
    return((char *) 0);
}
```


directory entry until it finds the filename that was passed to it. If the filename is found, it returns the logical sector number stored in that entry, otherwise it returns a value of zero. As explained previously, OS-9 uses a three-byte LSN, but the C compiler uses a four-byte long integer. Therefore we use the `l3tol()` function to convert the three-byte logical sector number to a long integer.

The `Find_Name()` function is similar except it reads each directory entry until it finds an entry with the same logical sector number that was passed to it. If it finds a matching logical sector number, it returns the filename, otherwise it returns an empty string. The `Find_Offset()` function is used to obtain the logical sector number of the dot and dot-dot entries, and the `Find_Name()` function is used to find the directory name that matches the dot entry.

The `Push()` function simply copies the filename passed to it into an array. We are actually building the pathlist backward so the first entry in the array is the last directory name in the pathlist. For that reason the `Print_Pathlist()` function prints the last name in the array first and traverses backward to the beginning of the array.

```

}

Push(name)
char *name;
{
    if(StackPointer < MAX_STACK) {
        strcpy(stack[StackPointer++], name);
    } else {
        fprintf(stderr, "Directory name stack full.\n");
        exit(0);
    }
}

Print_Pathlist(dir_pn)
int dir_pn;
{
    char buffer[30];
    char name[30];

    _gs_devn(dir_pn, buffer);
    strcpy(name, buffer);
    printf("/%s", name);

    while(StackPointer-)
        printf("/%s", stack[StackPointer]);
    printf("\n");
}

_gs_devn(dir_pn, buffer)
int dir_pn;
char *buffer;
{
    struct registers regs;

    regs.rg_a = dir_pn;
    regs.rg_b = 14;
    regs.rg_x = buffer;
    _os9(I_GETSTT, &regs);
}

```



NORTHERN TECHNOLOGIES

6030 North 43 Road, Nanton, MI 49663
(616)824-6633 BBS(616)824-6826

CARD COLLECTOR

Keep track of your card collection with this, OS9 Level II, program. List to the screen or printer, by name, team or position. Edit, expand, or shrink files.

ONLY \$9.95 + \$2.00 S&H

PRINTERS

Star Micronics NX-1000 Rainbow, 7 color printing, 144 cps draft/36 cps NLQ, 6.5k print buffer, 'paper parking', friction and tractor feed. Hi Res graphics.

ONLY \$260.00 + \$12.00 S&H

MODEMS

Avatex 1200e, 300/1200 transmission speed, auto dial/auto answer, 8 front panel lights, two year manufacturer's warranty.

ONLY \$80.00 + \$3.00 S&H

SmartTeam 2400AT, 300/1200/2400 transmission speed, auto dial/auto answer, call progress detection, 6 self test modes, 8 indicator lights, AT command set, two year manufacturer's warranty.

ONLY \$175.00 + \$3.00 S&H

Smart One 2400X, 300/1200/2400 transmission speed, auto dial/auto answer, 8 indicator lights, two year manufacturer's warranty. Hayes compatible, made in the U.S.A.

ONLY \$160.00 + \$3.00 S&H

DISKS

5 1/4" DSDD.....\$.40 ea
3 1/2" DSDD.....\$1.30 ea
5 1/4" DSHD.....\$.80 ea

All disks please include \$2.00 shipping and handling.

DISK FILES

5 1/4" Disk Holder, holds 75 5 1/4" disks.....ONLY \$8.75 ea
3 1/2" Disk Holder, holds 45 3 1/2" disks.....ONLY \$7.50 ea
5 1/4" Locking Holder, holds 75 5 1/4" disks, keep your disks away from unauthorized users.....ONLY \$12.50 ea
Copy Holder, w/top copy clip, non skid feet, detachable line guide. Only \$12.95 ea

DISK CLEANER KITS

5 1/4" kit.....Only \$6.95 ea
3 1/2" kit.....ONLY \$6.50 ea
All above items add \$2.00 S&H.

Cash, Check or Money Order. No COD's please.....

SPECIAL DEAL ON 500 PROGRAMS IS BACK!

BACK BY POPULAR DEMAND! GET OUR LATEST 50 DISKS OR TAPES FULL OF OVER 500 PROGRAMS! HERE IS WHAT YOU'LL RECEIVE:

- Over 250 Utility/Home application Programs including a Word Processor, DataBase, Spreadsheet, Disk Utilities, Business Software, Electronics Series, Educational Programs for Kids, plus much more!
- Over 200 Exciting Games (15 From Tom Mix), Including P51 Flight Simulator, SailorMan, The King, Family Feud, Air Attack, Moneyopoly, plus much more!
- Over 30 Adventures, Including Martian Crypt, Rambo, Dracula, Plus 32K Graphic Adventures!

Individual issues sell for \$9.00 each or \$450.00 for all 50. We **SLASHED** the price to only \$150.00!

REG. \$450 **NOW ONLY \$150.00**

TURN TO
PAGE 29
FOR A LISTING
OF OUR BACK
ISSUES

.. THIS MONTH ONLY ..

Buy this package of 500 programs and receive a FREE 6 month subscription.



T&D SOFTWARE • 2490 MILES STANDISH •
• HOLLAND MI 49424 • (616) 399-9648 •

NOVICES NICHE

CoCo 3

Letters & Numbers

by Robert I. Mills

Letters & Numbers is a short program for the CoCo 3 designed to help youngsters recognize letters and numbers as they are displayed on the screen and to find the corresponding keys on the keyboard.

It was originally written for my 3-year-old grandson who wanted to "do something on the 'puter," and it included only letters of the alphabet. Shortly after his fourth birthday, he asked that numerals be included.

The program randomly selects a character and, if it is a letter, presents it in both upper- and lowercase. It then asks you to press the corresponding key. A correct response results in a series of ascending tones and a congratulatory message. A new

character is then presented. An incorrect response results in a shorter series of descending tones and NO NO NO appears on the screen. The same character stays on the screen until the correct key is pressed.

The program has been well-received by my grandchildren, who are ages 3 to 7. They feel they are really doing something on the 'puter — and they are.

Easy modifications can be made to allow the program to run on a CoCo 1 or 2. Delete lines 50 and 70. Change LOCATE *n, n* to the appropriate PRINT@ in lines 80, 90 and 120. If your computer displays lowercase in reverse video, you may also want to delete the second semicolon and all those following it in Line 140.

The Listing: LETRSNUM

```
0 * COPYRIGHT 1990 FALSOFT, INC
10 'LTRS&NUM
20 'BY ROBERT I. MILLS
30 'BOX 464
40 'HANOVER, IL 61041
50 ON ERR GOTO 60
60 CLS
70 WIDTH40
80 LOCATE17,5:PRINT"LETTERS"
90 LOCATE17,6:PRINT"—"
100 A=RND(90)
110 IF A<48 GOTO100
120 IF A->58 AND A<=64 THEN 100
130 LOCATE7,10
140 PRINT"Press this key: ";CHR$(A); " ";:IF A <=57 THEN 150 ELSE
E PRINT CHR$(A+32)
150 LOCATE17,15:LINEINPUT"—>
";A$:IF A$=" " THEN150
160 B=ASC(A$)
170 IF B=> 97 THEN B=B-32
180 IF B=A THEN PRINT:PRINT"CORR
ECT! CORRECT! CORRECT! CORRECT!
YEA!" ELSE 200
190 FOR N=15 TO 200 STEP5:SOUND
N,1:NEXT:CLS:GOTO80
200 PRINT:PRINT:PRINT"NO NO NO":
FOR N=150 TO 15 STEP -5:SOUND N,
1:NEXT:GOTO 150
```

CoCo 3

Superpoke

by Geoff Friesen

The POKE command places a single byte in a single-memory location. *Superpoke* is a program that modifies the POKE command so it can place several bytes in successive memory locations. This feature allows programs that use many pokes to run faster and take up less memory.

The syntax for the new POKE command is as follows:

POKE *address, byte[, byte]*

Everything between the brackets can be repeated several times.

The listing contains a practical example that changes the OK prompt to a \$ prompt. Lines 260 and 270 make use of the enhanced POKE command.

Superpoke requires the LPOKE command in lines 210 and 220 and runs only on a CoCo 3.

The Listing: SUPRPOKE

```
0 * COPYRIGHT 1990 FALSOFT, INC
100 REM ———
110 REM SUPERPOKE
120 REM ———
130 FOR I=&H8023 TO &H8041
140 READ B$
150 POKE I,VAL("&H"+B$)
160 NEXT I
170 DATA BD,B7,3D,9F,2B,BD,B2,6D
180 DATA BD,B7,0B,9E,2B,E7,80,BF
190 DATA 00,2B,C6,2C,E1,9F,00,A6
200 DATA 26,04,9D,9F,20,EA,39
210 LPOKE &H7AB8B,&H80
220 LPOKE &H7AB8C,&H23
230 REM ———
240 REM CHANGE OK PROMPT TO $
250 REM ———
260 POKE &H8042,36,32,0
270 POKE &HAC77,&H80,&H41
280 POKE &HAC85,&HF0
290 POKE &HAC91,&HE4
300 POKE &HACEE,&H87
```

CORRECTIONS

CoCo Gallery On Disk: Volume 1 and 2 of the CoCo 3 version will not load the individual pictures from disk if you are using a CoCo 3 with ADOS or Disk BASIC 2.0 (what appears as Disk BASIC 1.0 on the CoCo 1 and 2). The menu aborts with a UL Error in Line 3 and the BASIC program completely vanishes from memory. If you are experiencing this problem and are using Disk BASIC 2.0 or ADOS, make the following change in Line 142 of MENU.BAS:

```
142 IF CP=0 THEN LOADM"NIBLOAD":
POKE &HE76,&HCE:POKE &HE77,&HE7
```


Solving Quadratic Equations

by William Flinn

Many of us have struggled through algebra classes wondering when all the graphing and factoring of quadratic equations would end. It was only after teaching us the tedious methods of factoring that the instructor would finally divulge the secrets of the quadratic formula — a simple yet quick method of solving quadratics.

The quadratic equation, taking the form of $ax^2 + bx + c = 0$, is used for solving many different kinds of complex problems. This equation provides what becomes the graphics representation of hyperbolas, parabolas and even circles. But to plot the points on the graph paper requires that you first solve the quadratic equation to find the numerical solutions for the x and y coordinates.

A quadratic equation has one, two or no real solutions, depending on the coefficients a , b and c specified in the equation $ax^2 + bx + c = 0$. Thus the quadratic formula comes into play and solves these equations in a few easy steps. Given the form:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

the coefficients can be plugged in place of a , b and c , and the solution(s) can be obtained. Sometimes the square root of $(b^2 - 4ac)$ is a negative number, in which case there are no real solutions.

As shown by the program listing, each element of the quadratic formula is broken down so only two terms are dealt with at a time. Just load and run QUADRATC, and the menu takes you through the steps of solving a quadratic equation by first asking you to input each of the three coefficients. If there are valid solutions, the program displays them. If no real solutions exist, the program states so and prompts you to try another equation. Simply press Y or N to continue or stop the program.

The program runs on any Color Computer with Extended Color BASIC, with or without disk drives.

The Listing: QUADRATC

```
0 ' COPYRIGHT 1990  FALSOFT, INC
10 CLS
20 PRINT" THIS PROGRAM SOLVES QU
ADRATIC  EQUATIONS USING THE QU
ADRATIC  FORMULA."
25 PRINT
30 INPUT" COEFFICIENT A:";A
40 INPUT" COEFFICIENT B:";B
50 INPUT" COEFFICIENT C:";C
60 J=4*A*C
70 K=B*B
80 L=K-J
81 IF L<0 THEN PRINT" THERE ARE
NO REAL SOLUTIONS  TO THIS Q
UADRATIC EQUATION.":GOTO 190
90 M=SQR(L)
100 N=-B+M
110 O=2*A
120 P=N/O
130 Q=-B-M
140 R=Q/O
150 PRINT
160 PRINT" 1ST SOLUTION:";P
170 PRINT" 2ND SOLUTION:";R
180 PRINT
190 INPUT"DO YOU WISH TO SOLVE A
NOTHER":A$
200 IF A$="Y" THEN10 ELSE IFA$="
N" THEN END
```

TAKE CONTROL OF YOUR OS9 LVI COLOR COMPUTER

< < INTRODUCING > >

Pt - FILE MANAGER - 19.95

Pt is a complete file management utility. Pt consists of 13 utilities for file management and 7 utilities for directory manipulation. All operate from within a point and shoot environment. Pt allows you to add point and shoot file selection to all your command line based programs. When started Pt displays a directory of the current data directory, with a cursor highlighting a file name. The cursor moves by using the arrow keys. Simply highlight a filename and press F to display the file manipulation menu or D to display the directory menu. A command can be entered and the highlighted file used as a parameter by pressing enter. Adds many new capabilities not realized in current OS9 utilities. Ideal for both hard-disk and floppy based systems.

S-SCREEN CONTROL UTILITY - 19.95

Gives complete control of your text screen in only 510 bytes. 34 built in mnemonic commands give simple command line control of your screen. Merge S into your shell and forget display codes forever.

M-MENUING UTILITY - 19.99

Create complete menuing systems for your OS9 LVI color computer using simple ascii text files. M merges into your shell for a memory resident menuing system.

ALL PROGRAMS 100 % MACHINE LANGUAGE MULTI-YUE NOT REQUIRED.

r3 Systems Consultants (602) 745-2327
4072 E 22nd Suite #178
Tucson, Az 85711

Az Residents add 7% sales tax.
Please add \$3.00 shipping and handling
Checks, Money Orders or C.O.D. orders accepted.

MATHEMATICS TEACHERS

```
* SCIENCE TEACHERS *
C LANGUAGE TEACHERS *
O
L Need a VERSATILE test writing program? T
O WRITEST (v 3.3) does MATCH/MULT CHOICE I
R T&F/SHORT ANSWER/LONG ANSWER and more: S
* Pica elite 17 cpi w/ double italic bold F
C double both subscripts + + + A
O symbols: x - 1 1 1 1 1 1 1 1 C
M 0 2 3 4 5 6 7 8 9 graphics: 0 0 0 T
P For: Tandy/Epson/Star/Panasonic/others I
U Req. 32KECB disk or tape. $15 Ppd O
T
E Other COCOSOFT Programs *
R
* WHOLENUM: practice + - x ÷ column + or U
I assorted in whole numbers, any size A
* Interactive, reward game, multiuser R
2 for 8/16/32K standard $8 Ppd A
*
3 Versions for: INTEGERS, LIKEFRACTIONS, T
* DIFFRACTIONS, MIXEDNUMBERS $8 Ppd E
f
o VOCABASE: THE vocabulary and spelling D
r core for YOUR words. Accepts extra *
* answers, repeats until right, quits o
D when all correct; reward and result *
I printout, 1-4 user. 16/32K $8 Ppd C
S
K CHEMTERM set of 3 for chemistry, based S
/ on VOCABASE. 16/32K $15 Set Ppd H
T
A COCOSOFT deduct $1/extra item A
P ad printed by WRITEST C
E>Box 665, House NM 88121 (505)-279-6455<K
```

CoCo Jumble

By Shane Messer

CoCo Jumble is a BASIC word game designed for the CoCo 1, 2 and 3. This game is for people of all ages and can be used as a vocabulary and spelling aid for younger children. I wrote two versions of *CoCo Jumble*. Version 2, presented here, runs on any CoCo with at least 32K and Disk BASIC. Because of its length, Version 1, which takes advantage of the CoCo 3's extended capabilities, is not printed in the magazine but is included on this month's RAINBOW ON TAPE/DISK.

The program is designed for two players but can be played by only one. To play you need a CoCo, a disk drive and, if you are running Version 1, joysticks.

The object of the game is to score points by forming words that cross and interlock on the game board. The score you receive is based on the combined point values of the letter tiles placed on the board and the point values of the positions where the tiles are placed. A listing of letter point values is shown in Figure 1. A handy feature of

CoCo Jumble is the ability to save games and load them later to finish playing.

Getting Started

Enter the listing and save it to disk as **JUMBLE2**. Make sure the program, whichever version you use, is saved on a disk with at least three extra free granules. This gives you the room you'll need if you decide to save a game.

After you run *CoCo Jumble*, you see a title screen; then the playing screen pops up. While Version 2 picks the players' letters for them, Version 1 players can use the joystick to select their seven tiles. Once the letters are selected, the top right-hand

Shane Messer is 14 years old and has worked on the CoCo for two years. He attends Lincoln Park Academy, and his interests include mathematics, science and playing soccer. Shane can be contacted at 3625 Orange Avenue, Ft. Pierce, FL 34947. Please enclose an SASE when requesting a reply.

A	--	1	N	--	1
B	--	3	O	--	1
C	--	3	P	--	4
D	--	3	Q	--	10
E	--	1	R	--	4
F	--	4	S	--	2
G	--	2	T	--	3
H	--	5	U	--	2
I	--	1	V	--	6
J	--	6	W	--	4
K	--	6	X	--	10
L	--	2	Y	--	6
M	--	2	Z	--	10

Figure 1: Letter Values

side of the screen changes and the program displays the main menu.

The game board in both versions is visible at the left side of the screen. The players' letters are displayed at the bottom left side. However, they are not displayed at all times, which prevents your opponent from taking a peek.

Game Play

Selecting V from the menu lets you view your letters. The program prompts you to press any key. Once you do this, your letters appear. Press any key to return to the menu.

The S and L selections allow you to save and load a saved game, respectively. No provision is made for unique filenames (the program always uses SAVEGAME/DAT), so make sure you save only one game on any particular disk. Make sure to load a game only when no tiles are present on the board, otherwise the game will crash.

Press N to pass, turning game play over to the other player. This is handy when playing solitaire.

To enter a word on the game board, press E (press P if you are running Version 1 for the CoCo 3.) Use the arrow keys or joystick (Version 1) to select a starting position for your word. The first word can

The S and L selections allow you to save and load a saved game, respectively. No provision is made for unique filenames so make sure you save only one game on any particular disk.

be placed anywhere on the board except on the outer edge. After this, the program asks if you want the word to run down (vertical) or across (horizontal) the board. Now you can enter a word, using only letters from the tiles you have selected. As you type, you don't have to enter letters where your word crosses others. The program automatically skips to the next appropriate position. The * tile represents a wildcard letter and has a

point value of 2. Using all seven tiles earns you a bonus of 80 points.

If you make a mistake, press F1 to erase your word and start again. Pressing F2 erases the word and returns you to the menu without passing play to the other player. If you don't have F1 and F2 on your keyboard, use the 1 and 2 keys in their place after you make the following modifications:

```
1040 IF A$="1" OR A$="2" THEN FO
R A=1 TO N: IF WD$>"" THEN GOSU
B 1100:NEXT A
1050 IF A$="2" THEN RETURN
```

When you are finished typing your word, press ENTER. If you don't see the cursor after a few seconds, your word is not placed correctly (it isn't crossing or touching an existing word.) If all is OK, the program jumps to the main menu and your score is displayed.

You can change your tiles during game play by pressing C. After changing letters, your turn is automatically passed and your opponent gets to play.

Pressing Q at the menu lets you quit the game. You are asked if you are sure. You are also given the option of loading or saving games.



Borhe & Borhe

P.O. Box 58342
Renton, WA 98058

U.S. ORDER DESK:
(800) 237-2409

INT'L & TECHNICAL:
(206) 432-1814

OS9 Software (* = at least 256K required; ** = 512K required):

FILE SYSTEM REPACK -- Reverses hard and floppy disk fragmentation, speeds up disk access.	\$29.95
R. S. B.* -- Real Super Extended Disk BASIC for CoCo 3 level 2 systems. BASIC ROM required.	\$39.95
EZGEN 1.07 -- Powerful disk-based bootfile editor. A real timesaver!	\$19.95
PERTASCI* -- Multi-user scrambled letter word game. 15,000 word expandable dictionary.	\$19.95
WILD & MV -- Use wildcards with most OS9 commands. Move directory entries.	\$19.95

BASIC Software (* = at least 256K required; ** = 512K required):

HYPER-I/O -- Disk BASIC for hard disk, big floppies. Hard disk users specify B&B or DISTO.	\$29.95
HYPER-I/O HARD DISK UTILITIES -- K. Berner's wildcard copy, delete, search.	\$21.95
DISK DOCTOR -- K. Berner's FAT/GAT editor. Also locates and hides media defects.	\$17.95
BEST OF BERNER -- Get a deal on both HARD DISK UTILITIES and DISK DOCTOR.	\$39.90
HYPER-III -- RAM disk (512K only) and printer spooler for CoCo 3 and HYPER-I/O.	\$12.95
DUNGEONS OF DAGGORATH -- Dyna Micro's popular cartridge. While supplies last.	\$ 9.95
DAGGORPATCH -- Adds disk I/O, auto-repeat & more to Dungeons of Daggorath.	\$ 9.95
RGB-DOS FOR B&B -- Another excellent hard disk BASIC, now compatible with B&B hard drives!	\$34.95

About HYPER-I/O and RGB-DOS . . .

Both HYPER-I/O and RGB-DOS are hard disk operating systems supplied on floppy disk. Each can be used as-is or burned into an EPROM for use with 64K software. HYPER-I/O requires a 16K EPROM and allows large floppy disks, hard disk directories as large as 3MB, and good machine-language compatibility. RGB-DOS requires an 8K EPROM and features superior compatibility with existing machine language software, but limits each hard disk directory to 160K. We recommend HYPER-I/O for BBS systems or BASIC programmers, and RGB-DOS for customers who mostly use commercial ML software.

Affordable Color Computer Hardware:

COCO XT -- Adapts PC hard drives to CoCo. OS9 software included	\$69.95
COCO XT-RTC -- CoCo XT, with a battery powered real-time clock.	\$99.95
XT-ROM -- Boots OS9 from B&B hard disk automatically.	\$19.95
4' B&B HARD DISK CABLE SET -- Extra long -- not the usual 24".	\$17.50

WA RESIDENTS ADD 8.1% SALES TAX.
U.S. COD's add \$3.30. Min. U.S. shipping
\$3.00. Min. shipping to Canada \$4.00.
Please allow 2 weeks for delivery.
Overnight or 2-day delivery available for
in-stock items.
Software upgrades \$5.00 each with receipt,
including U.S. shipping.

✓

270.....	46
380.....	62
560.....	43
750.....	35
930.....	177
1030 ..	186
1170	201
1320	161
1460.....	5
END	137

The Listing: JUMBLE2

```

10 *****
20 ***** COCO JUMBLE V 2.0 *****
30 *** COPYRIGHT (C) 1989 ***
40 ** BY FALSOFT, INC. **
50 * ALL RIGHTS RESERVED *
60 **
70 *** WRITTEN BY: ***
80 ***** SHANE MESSFR *****
90 *****
100 GOSUB 1450
110 FOR V= 1 TO 500:NEXT V
120
130 CLEAR 1000:DIM C$(9),D$(18),
E$(16,16),V(26)
140 GOSUB 210
150 GOSUB 430
160 GOSUB 270
170 GOSUB 350
180 GOSUB 580
190 GOTO 170
200
210 'TITLE SUBROUTINE
220 P=1
230 CLS:PRINT:PRINT:PRINT:FOR I=
1 TO 10:READ IS
240 A=LEN(IS):A=32-A:A=A/2:A=INT
(A):PRINSTRING$(A," "):FOR A=1
TO LEN(IS):PRINTMID$(IS,A,1):I
F I=1 AND MID$(IS,A,1)<>" " THEN
PLAY"V30T25503L255EA"
250 NEXT A:PRINT:NEXT I
260 RETURN
270 'SCREEN SETUP
280 FOR B=1 TO 8:READ D$(B):D$(1
6-B)=D$(B):NEXT
290 FOR A=1 TO 26:READ V(A):NEXT
A
300 FOR A=1 TO 15:FOR B=1 TO 15:
L$=MID$(D$(A),B,1)
310 IF L$="R" THEN PRINT CHR$(19
1): ELSE IF L$="P" THEN PRINT CH
R$(255): ELSE IF L$="B" THEN PRI
NT CHR$(175): ELSE IF L$="L" THE
N PRINT CHR$(223): ELSE PRINT CH
R$(128):
320 IF RR=1 THEN RETURN
330 NEXT B:PRINT:NEXT A
340 RETURN
350 ' CLEAR AND PRINT MFNU
360 PRINT @16," C O C O":PRI
NT@48," J U M B L E ":PRINT@80
," WRITTEN BY:":PRINT@112," SH
ANE MESSER":PRINT@239,"- - - -

```

```

- - - - -";
370 GOSUB 890
380 X=271:PRINT@X,"(V)IEW LETTER
S":X=X+32:PRINT@X,"(L)OAD - (S)
AVE":X=X+32:PRINT@X,"(E)NTER WO
RD":X=X+32:PRINT@X,"(N)EXT PLAY
ER":X=X+32:PRINT@X,"(C)HANGE LE
TTERS":X=X+32:PRINT@X,"(Q)UIT G
AME":X=X+64:PRINT@X+3,"PLAYER -
>":IF P=1 THEN PRINT"1":
390 IF P=2 THEN PRINT"2":
400 X=X-32:PRINT@X,"- - - - -
- - - - -";
410 EXEC 44539:A$=INKEY$
420 IF INSTR("LSCNQVE",A$)>0 THE
N RETURN ELSE 410
430 GOSUB 550
440 P=1:GOSUB 680:P=2:GOSUB 680:
P=1:RETURN
450 DATA C O C O J U M B L E .,
JUST FOR THE COCO 1 AND 2 !!!,W
RITTEN BY SHANE MESSER,"COPYRIGH
T (C). 1989",BY FALSOFT,..PIEAS
E WAIT...."
460 DATA RWLWLLWWLWWLWWR
470 DATA WPWWLWBBWWLWWPW
480 DATA WWPWWLWLLWWLWWPW
490 DATA LWLWWLWLLWWLWWPW
500 DATA WWWLWWLWWLWWLWW
510 DATA WBWWLWBBWWLWWLWW
520 DATA WLLWWLWLLWWLWWLWW
530 DATA RWLWLLWWLWWLWWR
540 DATA 1,3,3,2,1,4,2,5,1,6,6,2
,2,1,1,4,10,4,2,3,2,6,4,10,6,10
550 LL$="AAAAAAAAABBBBCCDDDEEEE
EEEEEEEEFFFGGHHIIIIIIJJJLLLL
LMMNNNNNNNOOOOOOOPPPRRRRSSSSST
TTTTUUUVVWWXYZ**":RETURN
560
570 NEXT
580 IF A$="Q" THEN GOSUB 660
590 IF A$="V" THEN GOSUB 810
600 IF A$="N" THEN GOSUB 860
610 IF A$="E" THEN GOSUB 900
620 IF A$="C" THEN GOSUB 1290
630 IF A$="S" THEN GOSUB 1390
640 IF A$="L" THEN GOSUB 1440
650 RETURN
660 X=271:FOR A=1 TO 6:PRINT@X,"
":X=X+32:NEXT:X
=271:PRINT@X," ARE YOU SURE?":P
RINT@X+32," Y/N":
670 EXEC 44539:B$=INKEY$:IF B$="
Y" THEN CLS:END:ELSE IF B$="N" T
HEN RETURN ELSE 670
680 'REPLACE LETTERS FOR PLAYER
690 N=0
700 IF P=1 THEN X$=P1$ ELSE IF P
=2 THEN X$=P2$
710 IF X$="" THEN X$=" "
720 FOR A=1 TO 7:IF MID$(X$,A,1)
=" " THEN N=N+1:NEXT A
730 FOR A=1 TO N
740 IF LL$=STRING$(105," ") THEN
1460
750 V=RND(105):IF MID$(LL$,V,1)=
" " THEN 750
760 FOR I=1 TO 7:IF MID$(X$,I,1)
=" " THEN MID$(X$,I,1)=MID$(LL$,
V,1):GOTO 770 ELSE NEXT I
770 MID$(LL$,V,1)=" ":NEXT A
780 IF INSTR(X$,"")>0 THEN 710
790 IF P=1 THEN P1$=X$ ELSE P2$=

```

```

X$
800 RETURN
810 GOSUB 880
820 X=272:PRINT@X,"READY PLAYER
":STR$(P):
830 EXEC 44539:A$=""X$=""
840 X=X+64:IF P=1 THEN X$=P1$ EL
SE X$=P2$
850 FOR A=1 TO 7:A$=A$+MID$(X$,A
,1)+" ":NEXT:PRINT@X+1,A$:EXEC 4
4539:GOSUB 880:RETURN
860 IF P=1 THEN P=2 ELSE P=1
870 RETURN
880 X=271:FOR A=1 TO 6:PRINT@X,"
":X=X+32:NEXT A
:RETURN
890 PRINT@143,"- - - - -
":PRINT@175,"PLAYER 1 ->"+STR$(
S1):PRINT@207,"PLAYER 2 ->"+STR
$(S2):RETURN
900 C$=CHR$(207)
910 X=8:Y=8
920 A$=INKEY$:GOSUB 960:IF A$=""
THEN 920
930 IF A$="^" THEN Y=Y-1:ELSE IF
A$=CHR$(9) THEN X=X+1 ELSE IF A
$=CHR$(8) THEN X=X-1 ELSE IF A$=
CHR$(10) THEN Y=Y+1 ELSE IF A$=C
HR$(13) THEN GOTO 970 ELSE 920
940 IF X>15 THEN X=1 ELSE IF X<1
THEN X=15 ELSE IF Y<1 THEN Y=15
ELSE IF Y>15 THEN Y=1
950 GOTO 920
960 YY=(Y-1)*32:XX=X-1:L=YY+XX:A
=PEEK(L+1024):POKE L+1024,ASC(C$
):POKE L+1024,A:RETURN
970 RO=R0+1:X1=X:Y1=Y:IF P=1 THE
N X$=P1$ ELSE X$=P2$
980 IF (X1=15 OR X1=1 OR Y1=15 O
R Y1=1) AND R0=1 THEN R0=R0-1:G
OTO 900
990 WD$=""DD=0:SS=0:PRINT@480,"
(S)IDE - (D)OWN":EXEC 44539:A$=
INKEY$:IF A$="D" THEN DD=1 ELSE
IF A$="S" THEN SS=1 ELSE 990
1000 IF DD=1 AND SS=1 THEN 990 E
LSE IF DD=0 AND SS=0 THEN 990
1010 EXEC 44539:A$=INKEY$
1020 IF A$=CHR$(8) AND WD$>" "THE
N GOSUB 1100:GOTO 1010
1030 N=0:IF A$="g" OR A$=CHR$(4)
THEN FOR I=1 TO LEN(WD$):IF MI
D$(WD$,I,1)< CHR$(255) THEN N=N
+1:NEXT I
1040 IF A$="g" OR A$=CHR$(4) THE
N FOR A=1 TO N:IF WD$>" " THEN GO
SUB 1100:NEXT A
1050 IF A$=CHR$(4) THEN RETURN
1060 IF A$=CHR$(13) THEN GOSUB 1
520:IF GG=1 THEN 1150
1070 IF E$(X,Y)<>" " THEN GOSUB 1
610
1080 IF X<16 AND Y<16 AND INSTR(
X$,A$)>0 THEN E$(X,Y)=A$:POKE 10
24+X-1+((Y-1)*32),ASC(A$):X=X+SS
:Y=Y+DD:WD$=WD$+A$:MID$(X$,INSTR
(X$,A$),1)=" ":ELSE SOUND 1,1
1090 GOTO 1010
1100 K=LEN(WD$)
1110 IF MID$(WD$,K,1)=CHR$(255)
THEN WD$=LEFT$(WD$,K-1):X=X-SS:Y
=Y-DD:K=K-1:GOTO 1110 ELSE 1120
1120 PRINT@X-SS+((Y-DD-1)*32)-1,

```



```

"";L$=MID$(D$(Y-DD),X-SS,1):RR=
1:GOSUB 310:RR=0:E$(X-SS,Y-DD)="
":X=X-SS:Y=Y-DD
1130 MID$(X$,INSTR(X$," "),1)=MI
D$(WD$,LEN(WD$),1):WD$=LEFT$(WD$
,LEN(WD$)-1)
1140 RETURN
1150 D=0:T=0:TS=0:CS=0:S=0:IF P=
1 THEN P1$=X$ ELSE P2$=X$
1160 L$=E$(X1,Y1):FW$=FW$+L$:IF
X1=X AND Y1=Y THEN 1230
1170 M$=MID$(D$(Y1),X1,1):IF M$=
"R" THEN T=T+1 ELSE IF M$="P" TH
EN D=D+1
1180 IF L$="*" THEN L$="A"
1190 L=ASC(L$)-64:L=V(L):IF M$="
L" THEN L=L*2 ELSE IF M$="B" THE
N L=L*3
1200 CS=CS+L
1210 X1=X1+SS:Y1=Y1+DD
1220 GOTO 1160
1230 IF D>0 THEN FOR A=1 TO D:CS
=CS*2:NEXT
1240 IF T>0 THEN FOR A=1 TO T:CS
=CS*3:NEXT
1250 IF X$=" " THEN CS=CS+
75
1260 IF P=1 THEN S1=S1+CS ELSE
S2=S2+CS
1270 GOSUB 680
1280 GOSUB 890:PRINT@480,"
":IF P=1 THEN P=2:RETU
RN ELSE P=1:RETURN
1290 GOSUB 880:IF P=1 THEN X$=P1
$ ELSE X$=P2$

```

```

1300 C=271:FOR X=1 TO 7:IF X=5 T
HEN O=X:GOSUB 880:X=O:C=271
1310 L$=MID$(X$,X,1)
1320 L$="CHANGE "+L$+"?":PRINT@C
,L$:C=C+32
1330 EXEC 44539:A$=INKEY$:IF A$=
"N" THEN NEXT X:GOTO 1350: ELSE
IF A$="Y" THEN GOTO 1340 ELSE 13
30
1340 MID$(LL$,INSTR(LL$," "),1)=
MID$(X$,X,1):MID$(X$,X,1)=" " :NE
XT X
1350 IF P=1 THEN P1$=X$ ELSE P2$
=X$
1360 GOSUB 680
1370 IF P=1 THEN P=2 ELSE P=1
1380 RETURN
1390 SAVEM"SAVEGAME",1024,1635,1
024
1400 OPFN"O",#1,"SAVEGAME":FOR I
=1 TO 15:FOR A=1 TO 15:WRITE #1,
E$(I,A):NEXT A,I:WRITE #1,LL$,P1
$,P2$,S1,S2:P
1410 CLOSE
1420 PLAY"T5L5A"
1430 RETURN
1440 LOADM"SAVEGAME":OPEN"I",#1
,"SAVEGAME":FOR I=1 TO 15:FOR A=
1 TO 15:INPUT #1,E$(I,A):NEXT A,
I:INPUT #1,LL$,P1$,P2$,S1,S2,P:C
LOSE:PLAY"T5L5A":RETURN
1450 CLS:PRINT:PRINT:PRINT:PRINT
" PRESS ANY KEY TO STOP TIMER.."
:FOR I=1 TO 500:PRINT@164,"
" <:"PRINT@173,I::A$=INK


```

```

EY$:IF A$<>" " THEN RETURN ELSE C
=RND(I):V=RND(T/4):NEXT I:GOTO 14
50
1460 CLS:IF S1>S2 THEN P$="PLAYE
R 1" ELSE P$="PLAYFR 2"
1470 IF S1>S2 THEN S=S1 ELSE S=S
2
1480 V$="":V$=P$:V1$=" WINS WITH
A SCORE OF"+STR$(S)
1490 PRINT " " "V$
1500 PRINT@484,V1$:
1510 GOTO 1510
1520 IF R0=1 THEN 1590
1530 IF INSTR(WD$,CHR$(255))>0 T
HEN 1590
1540 FOR A=X1-1 TO X1+1:FOR B=Y1
-1 TO Y1+1
1550 IF A<1 THEN A=1 ELSE IF A>1
5 THEN A=15
1560 IF B<1 THEN B=1 ELSE IF B>1
5 THEN B=15
1570 IF SS=1 THEN IF E$(A,B) <>"
" AND (B<>Y OR (A<X1 OR A>X) ) T
HEN 1590 ELSE NEXT B,A:GOTO 1600
1580 IF E$(A,B) <>" " AND (A<>X O
R (B<Y1 OR B>Y) ) THEN 1590 ELSE
NEXT B,A:GOTO 1600
1590 GG=1:RETURN
1600 GG=0:RETURN
1610 WD$=WD$+CHR$(255):X=X+SS:Y=
Y+DD
1620 IF X>14 OR Y>14 THEN RETURN
1630 IF E$(X,Y)<>" " THEN 1610 EL
SE RETURN

```





TUTY

When TUTY begins the fun never ends! Play against the computer or up to four players may compete against each other. TUTY was created with the family in mind and is enjoyed by both young and old. TUTY has a great combination of skill and chance that makes everyone a winner.

- * Great graphics and sound effects.
- * Requires CoCoII or III, Disk drive..
- * Optional: Joystick, RGB monitor.
- * Shipping and handling included..

TUTY:....\$24.95

Send check or money order to:



CB GAMES
P.O. BOX 2496
KALISPELL, Mt. 59901
Phone (406) 257-3832

They're Moving on Without You!

That's right! Thousands of CoCo III Programmers and Users are moving ahead without you. Why? Because they're discovering "Revelation!" a new software package from Robert Offermann.

With "Revelation!" here's what you get

225 lines of Hi-res graphics
28 lines of text
Onscreen status display
High speed disk access
62 Macro keys
Keyboard entry of:
International characters
Control characters

Revelation! is available for \$25.00 plus \$1.00 shipping and handling. Send check or money order to:

Robert Offermann
2447 Oak Park Way
Orlando, FL 32822

Cashiers Cheques and Money Orders will result in the promptest delivery

All in 128k. Not one byte of user memory is lost. Don't settle for 192 or 200 lines of resolution. And don't settle for anything less than "Revelation!"

Don't be left Behind!

The A-Option Wrap-Up

by Joseph Kolar
Contributing Editor

This is the wrap-up chapter of the A-option phase. You have been subjected to an awful lot of "mask this, unmask that." As usual, there is a method to all this madness.

REM is a very desirable tool to have at your command when programming. REM allows you to temporarily put program lines or portions of program lines into mothballs to aid you in checking alternate lines and variants. It also allows you to skip around to other segments of a routine or hop to some other program section.

The operative word is *alternate*. For the keen-minded reader, an alternate menu is masked with a REM. During a programming session you mask and unmask lines to conduct tests on part of a program, or you reach for options. When the program is complete, the REMs become options in a menu.

In this tutorial we are going to work REM to death. Keep in mind while you are working that you are programming by proxy.

Refer to Listing 1. You may have rewritten the core of the program from a previous tutorial so that the program lines run in a logical sequence, with the design displayed and then removed. Room was made available to list Line 5, the routine beginning at Line 500, and lines 620 and 621. These designs were covered in the last tutorial. Type them into your final listing to check them. Base your routines beginning at Line 500 on the routines beginning at Line 600 in Listing 1 of this tutorial.

A new technique is introduced to add variety in displaying Swazicross on the screen. Type in lines 6 through 280 and run

the program. Swazicross is displayed like a slow-motion flower growing and unfolding. Actually, the design units are drawn one at a time, running in a counterclockwise direction and advancing to the next higher step size until all sizes are displayed in all four quadrants. Lines 105, 107 and 130 complete this nested loop.

To dissolve this design, lines 222, 223 and 260 make a loop that cause it to shrink into infinity. It shrinks so rapidly that whether or not it withers away in a clockwise or counterclockwise direction is not important. The alternate method is to unmask Line 132. This holds the display longer but wipes it out instantaneously. It is a programming aid only. Who wants to see a design come and go like a yo-yo when he is busy working on it? Once the design is finished, it is more elegant to magically reduce the design into oblivion.

Rather than discuss all the normal options to draw or erase a graphic, we will place the hot scoop into a loop table.

Together means all four A options are placed in a given size on the screen. *Individual* means an A option is put on the screen in all sizes in one quadrant before we go to the next A option. *CCW* and *CW* stand for counterclockwise and clockwise, respectively. *In* means a design evolves from the outside toward the center. *Out* means the design begins at the center of the screen and increases outwardly. *A up* means stepping the design in a clockwise direction and *A down* means step it in a counterclockwise direction. *S up* means increase the size by steps while *S down* means decrease the size.

Some A option lines may have to be retyped rather than make extra REM lines, which may only serve to confuse you. REM is more useful because the masked line is alive but dormant. It is so easy to forget the contents of a previously altered or erased

line when you want to restore the original lines.

By no means have we exhausted the possibilities. I am not eager to make a complete table and deprive you of the excitement of discovering the many possibilities and demonstrating them on the screen. Choose the ones that tickle your fancy and make saves of examples of those forms. Remember, you can always strip away the excess baggage and use the core of the listing, lines 9 through 280, for demonstration purposes. You may want to list your favorites in a notebook for handy reference.

You can experiment and draw the design from the largest element to the smallest. You should wind up with eight ways to draw the design (see Table 1): together or individual, in or out, clockwise or counterclockwise. Naturally, the same applies to erasing segments. You can see, by making your selections to draw or erase, you have the tools to create lots of variety in your presentations. And don't forget the instantaneous wipe-outs!

There are other possibilities as well. Some we mentioned in passing, and others you will stumble upon as you continue to investigate and experiment.

If you get an NF Error in lines 260 and 261, the loops are reversed. Switch to the other line with NEXT. Take plenty of time. Manipulate the REMs that create the FOR/NEXT loops and you will be amply rewarded.

Type in lines 6 and 600 to the end of the listing. Let us examine various designs. Unmask lines 6, 600 and 622. Mask Line 100 and run the program. We get the A0 design with cross-hairs. Run it with Line 632 masked. The rest of the design units are drawn and erased. The cross hairs fall away and the finished design is displayed on the two random screens.

The first A0 portrayal is a naked design

Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the power of the CoCo.

unit in STEP-4 size. The entire design is drawn in STEP-2 to add more detail. Unmask lines 632 and 623 and run the program. Mask Line 632 and run it again. Each design element looks like a crystal. Are you using your graph paper? Suppose we remove the final M-2, -1 in Line 623 — it ruins our crystal effect. Unmask Line 632 and run the program. In Line 623, substitute other values in the first M direction. In other words, M+3, +1; M+2, +1; M+4, -3. Watch where the design points. If you used M+2, +2, what does your graph paper plot tell you?

No matter what alterations are made, interesting effects are created. If you feel adventurous, make B jump moves out of the M directions you are playing with. Then try substituting N for the B. Personally, I like using NM+4, -3.

Using directions other than the regular E, F, G and H directions tilts the design to the right. Can we tilt it to the left? You may have already done so. The advantages of M

motion directions is that, while H confines us to one absolute direction in the fourth quadrant, M allows us to make more subtle angles, depending on the length of the line drawn (L). The length of the line plus the length of the line minus two ($D=L+L-2$) equals the number of other directions allowed by the CoCo in that quadrant. Therefore instead of only an H5 direction in the fourth quadrant, you have eight other directions as well.

Unmask Line 623. Type in Line 620 so that in succession you have A\$="M-5, -1" through "M-5, -4"; then "H5", (M-5, -5); then "M-4, -5" through "M-1, -5". Now run each one separately.

We might as well as have some fun. Let's put all these directions in the proper order to see what comes up. Retype the following line:

```
620 A$="M-5, -1M-5, -2M-5, -3M-5, -4
H5M-4, -5M-3, -5M-2, -5M-1, -5"
```

Then run the program. Oops! In Line 630 change BM128,96 to BM255,191. Change X=40 to X=20 in Line 629. Run the program again. We have drawn five very gently curving lines in sizes 4 to 20 in STEP+4.

If you plotted it out on graph paper, you knew ahead of time what the CoCo was going to do. Mask Line 632. Restore lines 629 and 630 to their original state, then run the program. (It looks like ostrich feathers.) You can alter the program so the design doesn't crash and then save a copy for posterity's sake.

Unmask Line 632 and Line 624, then run the program. Mask Line 632 and run. Have you noticed that interesting erase designs keep cropping up? Unmask lines 632 and 624 and run the program. Mask Line 632 and run the program again. Next check out the design in Line 625. The design in Line 626 is an optical illusion. CoCo is playing tricks on us. Next check out the designs in lines 627 and 628.

MLBASIC 2.0 - BASIC Compiler

If you want your BASIC programs to run up to 50 times faster, or want more programming features without learning another language, MLBASIC is for you. MLBASIC is the most compatible BASIC compiler available for the Color Computer. WHY? Because MLBASIC fully supports:

- Low- and high-resolution graphics
- All types of I/O (disk, screen, printer, RS232)
- All available commands offered with BASIC
- Floating point functions and expressions
- Integer, floating point and string type variables and arrays
- Use of all available 512K RAM in the COCO 3
- 80,40 or 32 column text displays

MLBASIC not only contains everything that you would expect a BASIC programming language should contain, MLBASIC has features that offer flexibility of other languages like C, Pascal, FORTRAN and even assembly language. These features will allow programmers to directly access the CPU registers on the COCO, produce modular program code with SUBROUTINES, manipulate memory in blocks, and even call ROM routines in other areas of memory.

MLBASIC revision 2.0 has incorporated all enhancements that were suggested by MLBASIC 1.0 users and more. Revision 2.0 did away with all the incompatibility problems that existed with revision 1.0.

MLBASIC allows for the first time user to quickly compile a program using default compiler settings. The advanced user has the capability of controlling over a dozen settings which control where the program is compiled, which medium to compile to (memory or disk), string space, compiler listings and more.

With all this going for MLBASIC, your might expect the cost to be a little out of your budget. After looking at prices of other BASIC compilers for the COCO 3 you might be correct. But look again at this ad; for only \$59.95, you can have a programming language that will spark your interest once again in the COCO.

Before you buy another BASIC compiler for the COCO, find out if it supports everything MLBASIC supports. Then look at the price tag. We feel that it won't be long before you place an order for MLBASIC.

"MLBASIC is a fine program for any serious programmer,"
said David Gerald in the December 1987 RAINBOW.

<<<<< **ONLY \$59.95** >>>>>

COCO 3 WITH DISK REQUIRED - Add \$4.00 Postage.

Check, Money Order or COD accepted

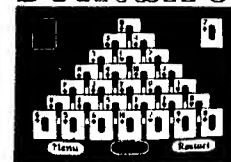
Foreign orders use U.S. MONEY ORDERS only.

WASATCHWARE
7350 Nutree Drive
Salt Lake City, Utah 84121
Phone (801) 943-1546

Classic



Solitaire



Throw away that deck of cards! Play according to Hoyle in style on your CoCo3. Includes the classic games of Canfield, Pyramid, and Klondike. Full color graphics. Four levels of play from easy to expert. Requires joystick or mouse and one disk drive. \$14.95

128K CoCo3
1 Disk Drive

ZENIX

Joystick
\$29.95

Fight your way through waves of Xenians in this fast-paced arcade game by Jeremy Spiller and Mike Newell. Experience breakneck speed. Exceptionally smooth 320x225 graphics. 32 levels of play. Sound. 100% machine language. Compatible with The Power Gauntlet by Specialty Projects.

Checks, money orders, MasterCard & Visa. All orders add \$2.00 shipping and handling. C.O.D. please add an additional \$2.00. Washington addresses add 7.5% Sales Tax.

Eversoft Games Ltd
P.O. Box 3354
Arlington, Wa 98223

(206) 653-5263
10am to 6pm PST

ON	TOGETHER	CCW	OUT
	105 S up		
	107 A down		130
OFF	TOGETHER	CCW	IN
	222 S down		
	223 A down		260
ON	TOGETHER	CW	OUT
	105 S up		
	107 A up		130
OFF	TOGETHER	CCW	OUT
	221 S up		
	223 A down		260
ON	INDIVIDUAL	CCW	OUT
	104 A down		
	105 S up		131
OFF	INDIVIDUAL	CW	OUT
	220 A up		
	221 S up		261
ON	INDIVIDUAL	CW	OUT
	104 A up		
	105 S up		131
OFF	INDIVIDUAL	CW	IN
	220 A up		
	222 S down		261

Table 1: Design Possibilities

Unmask lines 7, 700 and 720 and run the program. Mask Line 732 and run the program again. This rhomboid shape has unexplained dots in the second quadrant. You can cover up the dots by inserting NF3 at the beginning of Line 720. The alternate method is to add NH3 to the end of Line 720. Inserting NL3NF3 at the beginning of Line 720 produces a nice effect. Check out the designs in lines 721 and 722. Mask Line 732, unmask Line 723, and run the program. If you don't pay close attention, it is difficult to identify the design unit.

Leave Line 732 masked and unmask Line 724. Now run the program. This gives nice effects, both drawn and erased. Try this out by inserting BH2 at the beginning. It is difficult to guess what a design will look like after viewing the A0 unit. If you removed the N from Line 724, the design looks somewhat like a map of Texas.

Unmask Line 725 and run the program. This is a high-caliber design. Note how slowly it appears and disappears. The longer the program line, the longer it takes CoCo to execute it — a decided advantage in this case. It seems to pulsate. Insert BD3 at the start of Line 725. Outside of ruining a super design, watch how CoCo convolutes inward to a "That's all, folks" ending.

Unmask Line 726 and run the program. This is a fancy Vienna-waltz medal. Unmask Line 727 and run the program. A design need not be too big or complex to have merit. Short program lines, as in Line 727, are great to modify. You are invited to experiment with this design. Inserting L3 in

the line causes a nice break-up display.

Unmask Line 728 and run the program. This is a replica of the perseverance medal you just won for struggling through this tutorial.

There is no reason why you can't draw two different designs to make a spectacular rendition. Choose well-balanced designs, one of which should be oriented along the U, D, L and R axes and the other in E, F, G and H orientation. Here is an example using very basic design elements:

```
100 A$="R3U2R3D4L3U2L3"
101 C$="E2U2R3ULD3L2G2"
```

These design elements were drawn so they end at the starting point. This is vital if you plan to push the designs outward from a point of origin.

To the ends of lines 120 and 250, tack on +C\$. Add a temporary hold line:

```
140 GOTO 140
```

and run the program. See how massive the horizontal/vertical design is? It overshadows the puny diagonal design. The C\$ design can be reworked or pushed out. Change E2 at the beginning of Line 101 to E4, then run the program. Let's push it out one more unit. Change E4 to E5 in Line 101. Then run the program. The diagonals are on the verge of overwhelming the formerly massive-looking cross. This is unbelievable! Repeat these last three experiments, E2, E4 and E5. See how unrelated the displays appear? In-

credible! The height of the vertical element is 11 centimeters, in each case, on my monitor. In the first instance it is very massive, and in the last instance it becomes a secondary design.

Check the graph paper plot of these designs to see how increasing the first element in a symmetrical element pushes the design outward. To see this in reverse, change the first R3 to R and the final L3 to L in Line 100. In Line 101 change E5 to E3, then run the program. Not bad, but E4 may look better to you than E3. Try it! If you want to see the diagonal design nearly disappear yet give strength to the cross, insert N in front of E3. Type in DEL140 and run the program. This last demo has an intriguing erase show.

I hope you had fun making these shapes. There are a lot of loose ends for you to tie together. Make up your own shapes. Review these last four A-option tutorials and use up the graph paper. Allow me to end this tutorial with the flag of Moldavia from Dynastyland.

At the beginning of lines 629 and 729, insert GOT0100. The colon was left out at the end because the REM marker effectively hides the second statement. Add Line 140 GOT0 700. Mask lines 100, 101, 610, 632, 700 and 710. Unmask lines 6, 600, 622 and 728. Then run the program. To make this flag draw and erase both designs at the same time:

Change A\$ to C\$ in Line 728.
Change 100 to 9 in Line 729.
Type DEL600:DEL629:DEL140.

Finally, like a good programmer, strip off unessential lines and put the program into a logical, straightforward format. The listing is shortened significantly. If you want to try and tighten up your program, do so now and compare it with Listing 2.

16K Extended

120	.....	126
261	.....	76
624	.....	114
700	.....	118
726	.....	122
END	.....	27

Listing 1: AOPTION1

```

0 'LISTING1
6 'GOTO600'ON THE BIAS
7 'GOTO700
9 T=RND(2): ON T GOT010,11

```



```

10 PMODE4,1:PCLS:SCREEN1,0:GOTO1
00
11 PMODE4,1:PCLS:SCREEN1,1
100 A$="BH2U3R3G3L3U3E3"
104 'FOR A=3 TO 0 STEP-1
105 FOR S=4 TO 40 STEP2
106 'FOR S=40 TO 4 STEP-2
107 FOR A=3 TO 0 STEP-1
110 B$="S"+STR$(S)
115 D$="A"+STR$(A)
120 DRAW "BM128,96"+D$+B$+A$
130 NEXT A,S
131 'NEXT S,A
132 'FOR Z=1 TO 2000:NEXT:GOTO280
200 FOR Z=1 TO 600:NEXT
220 'FOR A=0 TO 3
221 'FOR S=4 TO 40 STEP2
222 FOR S=40 TO 4 STEP-2
223 FOR A=3 TO 0 STEP-1
240 B$="S"+STR$(S):D$="A"+STR$(A)
)
250 DRAW"C4BM128,96"+D$+B$+A$
260 NEXT A,S
261 'NEXT S,A
270 'FOR Z= 1 TO 2000: NEXT:PCLS:
:GOTO 9
280 FOR Z=1 TO 200:NEXT:PCLS:GOT
09
600 'PMODE4,1:PCLS:SCREEN1,1
610 DRAW"BM0,96R128NR128NU96D96"
620 '
621 '
622 'A$="BE4U2R3ULD3L2BG4"
623 'A$="M+3,-2U2R3M-1,3M-2,-1"
624 'A$="M+3,-2M-1,-2R4M-1,3M-2,
-2M-3,2"
625 'A$="M+3,-2U3R7U2L2D5L5M-3,2
"
626 'A$="BM+6,-4H2M+4,-1F2M-2,3H
2BM-6,4"'OPT. ILL.
627 'A$="U2R6U2NM+3,-2L3D4L3"
628 'A$="U4R3D2M+3,-2NLNDM-3,2R3
D2L6"
629 FOR X=40 TO 4 STEP-4
630 DRAW"S=X;BM128,96"+A$
631 NEXT X:FORZ=1TO2000:NEXT
632 GOT0632
633 GOTO 100
700 'PMODE4,1:PCLS:SCREEN1,1
710 LINE(0,96)-(255,96),PSET:LIN
E-(128,191),PRESET:LINE-(128,0),
PSET
720 'A$="M+1,-2M+2,-1M-1,2M-2,1"
721 'A$="M+3,-2U3M+3,-1D2M+3,-2M
-3,2R2G2L3M-3,2"
722 'A$="BM+3,-2U2R6U2L3D4L3"
723 'A$="M+1,-5FD2NG2R2FM-5,1"
724 'A$="M+1,-3NF2ER2D2GM-3,1"
725 'A$="EFGHREFGHR2F2G2H2UEFGH
DEFGHDEFGH"
726 'A$="RNENFRNHNGRNNENFR"
727 'A$="UNLREFGH"
728 'A$="BL4EGFHRHFGERGEHFRFHEGE
FGH"
729 FOR X=4 TO 40 STEP 4
730 DRAW"S=X;BM128,96"+A$
731 NEXT X:FORZ=1TO2000:NEXT
732 GOT0732
733 GOT0100
999 GOTO 999

```

✓ 110 153
END 197

Listing 2: AOPTION2

```

0 'LISTING2
9 T=RND(2): ON T GOT010,11
10 PMODE4,1:PCLS:SCREEN1,0:GOTO1
00
11 PMODE4,1:PCLS:SCREEN1,1
100 A$="BE4U2R3ULD3L2BG4"
101 C$="BL4EGFHRHFGERFEHFRFHEGEF
GH"
105 FOR S=4 TO 40 STEP2
107 FOR A=3 TO 0 STEP-1
110 B$="S"+STR$(S)
115 D$="A"+STR$(A)
120 DRAW "BM128,96"+D$+B$+A$+C$
130 NEXT A,S
200 FOR Z=1 TO 600:NEXT
222 FOR S=40 TO 4 STEP-2
223 FOR A=3 TO 0 STEP-1
240 B$="S"+STR$(S):D$="A"+STR$(A)
)
250 DRAW"C4BM128,96"+D$+B$+A$+C$
260 NEXT A,S
280 FOR Z=1 TO 200:NEXT:PCLS:GOT
09

```

Looking for the **BEST SERVICE, BEST SELECTION,**
and **BEST PRICES** on your CoCo shopping needs?

COCO PRO!

At CoCoPRO!, we bring you the best **VALUE** for your CoCo shopping dollar. We carry a wide variety of **NEW** hardware products at prices *too low* to advertise, **gently USED** hardware products (with full 30-day warranty), as well as something you will find *nowhere* else. . . **gently USED SOFTWARE** at **INCREDIBLE** savings (30-80%) over full retail (easy on the *wallet*, easy on the *conscience*)!! Our inventory changes **daily**, and contains at least 120 of your favorite CoCo software titles at all times!! All legitimate copies, with full documentation!!

HOW can you find out what bargains await you in our current inventory?
Send \$3 (refundable with \$20 purchase) for our **Catalog on Disk**, or \$10 for 12 monthly issues.

* OR *

If you have a modem, call our BBS for the latest listing of inventory, with **ONLINE ORDERING** via VISA/MC!! BBS no. is (313)663-6207 (5 lines, 7-E-1, 3-1200. Type "coco" at login prompt.).

Call or write TODAY... before someone else gets that item you've been looking for!!

COCO PRO!

1334 Byron
Ypsilanti, MI 48198
(313)481-DAVE(3283)

We accept VISA, MASTERCARD, Checks, and Money Orders. Credit Card orders, please add 5% to total. All orders shipped same day via UPS Ground. C.O.D. orders add \$4.00.

Nine-Times

The first magazine devoted exclusively to OS-9!

Every other month you will receive a disk *jam-packed* with programs and articles *all* for **OS-9**.

Each issue contains: 9 helpful and useful programs to help build your OS-9 library * Instructions, examples, and samples of Basic09 procedures and subroutines to help with your own programs and your understanding of Basic09 * C programs and programming examples * Program reviews, Hints, Help columns, and informative articles to advance your knowledge of OS-9 * Supplied totally of 5.25" disk * Dound manual sent to each new subscriber for help in getting *Nine-Times* up and running, as well as tips on using it with a ram disk or hard disk * All graphic/joystick interface for ease of use.

1-Year Subs, \$34.95 Canadian postage, add \$1.00
Foreign postage, add \$7.00

Back Issues: Available for the May, July, Sept., and Nov. 1989, Jan., & March 1990 issues. Please write for information on Back Issue contents.

Back Issue, ea. \$7.00 Foreign postage, add \$1.50 ea.

Magazine Source: Due to many inquiries, the source code for the magazine graphic shell is being provided as an informational tool. Included is the actual Basic09 source code and compiled modules on disk, as well as documentation and a printed copy of the source code.

Source, \$24.95 Foreign postage, add \$1.50

To order, please send U.S. check or money order to:

JWT Enterprises
5755 Lockwood Blvd.
Youngstown, OH 44512

Technical Assistance:
(216)-758-7694

Sorry, no C.O.D.'s or credit cards; Foreign & Canadian orders, please use **U.S. money orders**. U.S. checks, allow 3-4 weeks for receipt of first issue/back issue.

Copyright (c) 1989

OS-9 is a trademark of Microware Systems Corp. and Motorola, Inc.

Breaking the 32K Barrier

by Greg L. Zumwalt

How all that information fits into one little ROM pack

Seems like just yesterday when I bought my first Color Computer. I remember putting it out on the living room floor, with a handful of Program Paks, and spending the better part of the evening trying my hand at skiing, chess, battling dinosaurs and fighting aliens from another world.

Since those days, the Program Pak has grown from 4K to 16K. The programs have

grown in complexity and graphic detail. With the introduction of the Color Computer 3, the 32K Program Pak was introduced and the sophistication of the newer games grew even more.

However, the video games for the video-game-only systems quickly outpaced the complexity of the games for the Color Computer family. These games took hours, days and sometimes even weeks to play. As a developer, my instincts convinced me to dismantle one of the less popular game packs in our household (at the risk of becoming permanently disowned by the younger members of the family) to see how such a complex game could fit inside. As I expected, the game used two large ROM

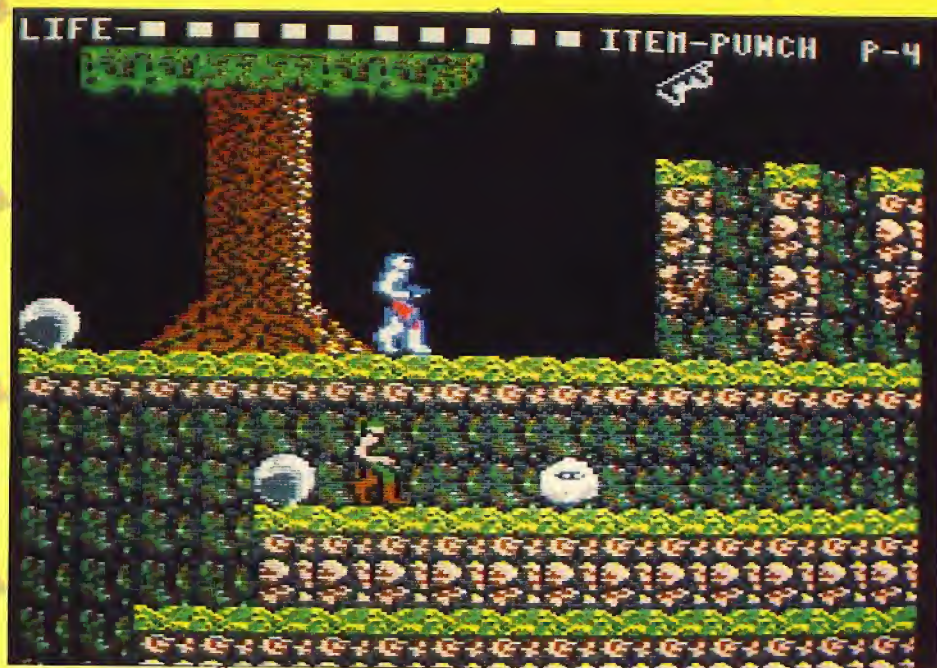
chips, for a total storage capacity in the range of one million bits. At best, the 32K capacity of the Color Computer 3 Program Pak is only one-fourth of this capacity (1,048,576/262,144).

Some of the questions I was posed with are: Can the mega-bit programs found in these games fit into a Program Pak's architecture? What sacrifices would be made? How much would it cost?

Hardware/Software Considerations

The first, and perhaps most obvious, solution was to redesign the Color Computer so the increased capacity is built into the computer, and not the Program Pak. Logically, putting a gate array for address

An independent programmer and computer designer, Greg Zumwalt owns zct Software of Tulsa, Oklahoma. zct is the developer of the Predator and RoboCop ROM Paks.



decoding and mega-bit ROMs in the Program Pak increases the price to prohibitively high levels. This approach would require all of us who wanted the newer Program Pak games to buy new computers, increasing the total expense even more. Not a good solution.

What about smaller ROMs and a less expensive approach to decoding the increased capacity? This idea is a little better, but by itself this solution requires that the games still be less complex than counterparts because of the smaller amount of available storage.

What about a combination of smaller ROMs, less expensive decoding and software? Perhaps this is the best solution.

Developing the Hardware

The first step in developing the hardware design is to determine how the larger ROM is to be addressed. My first choice is to treat the ROM as 32K pages of memory and design the hardware accordingly. The technique of paging is somewhat like the Color Computer 3 memory management unit (MMU), although a lot simpler. Under program control, the Color Computer 3 is placed in the 32K external ROM mode. Then, using a miniature version of an MMU, the program can select which of the two 32K pages of, for example, a 64K ROM, appears in the external ROM address space. However, this immediately limits the increased ROM capacity to the Color Com-

puter 3, leaving the Color Computer 1 and 2 by the wayside. I decided this was an unacceptable approach and treated the ROM as 16K pages, allowing the use of the 16K internal and 16K external ROM mode that is compatible with the entire Color Computer family.

The second step involves designing the miniature MMU that provides access to the various 16K pages. The miniature MMU is a simple latch, but it has to be located in an area of memory that always remains mapped in the 64K address range of the 6809 microprocessor. Thus it is not affected by the memory mode (all RAM, 16K internal/16K external) or paging process. The solution, built into the Color Computer, is a strobe

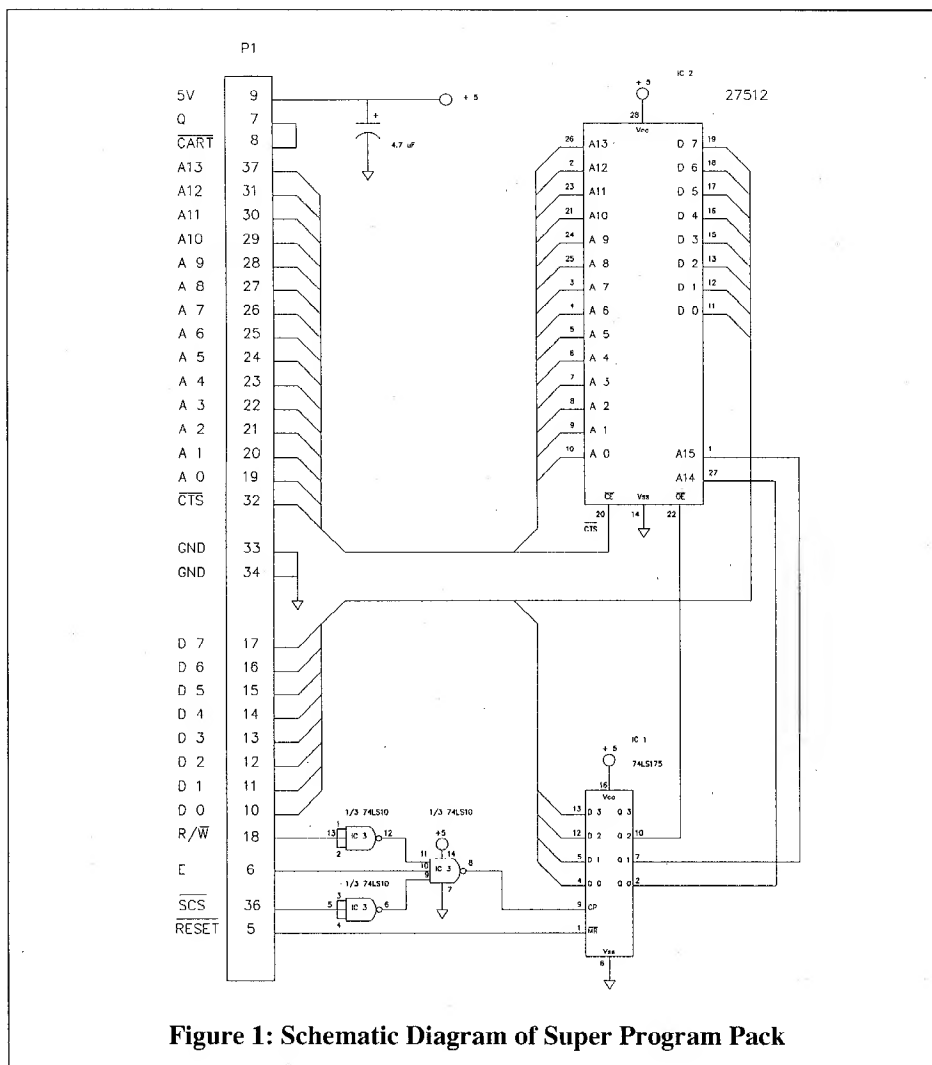


Figure 1: Schematic Diagram of Super Program Pak

labeled *SCS, or Secondary Chip Select. (The first chip select is the Cartridge Select strobe, or *CTS, for the ROM itself as described in the Color Computer 3 service manual.) This strobe is active for both reads and writes to addresses \$FF40 through \$FF5F, regardless of the memory mode. Using this strobe and the miniature MMU, the program simply writes a page number in order to gain access to the various pages.

Hardware Breakdown

Figure 1 is a schematic diagram of the 64K-by-8 bit EPROM version of the Super Program Pak. As can be seen from this diagram, only three ICs are required.

IC2 is the 64K-by-8 bit EPROM. This IC contains a game or other program, the data for the game or program and a program to access the various ROM pages. Address pins A0 through A13 of this IC are connected directly to the edge-card connector P1, as would be a standard 16K ROM. The Chip-Enable strobe at Pin 20 is connected to the Cartridge-Select strobe provided by the Color Computer at Pin 32 of P1. The eight data pins D0 through D7 are also connected directly to the edge-card con-

necter P1. Address pins A14 and A15 and the Output-Enable strobe at Pin 22 are all connected to the outputs of IC1, a 74LS175 that serves as our miniature MMU.

IC1 is a quad latch with a strobe input (Pin 9), a Master-Reset input (Pin 1), four data inputs, D0 through D3 (pins 4, 5, 12 and 13), and four data outputs, three of which, Q0 through Q2, are used in the Super Program Pak (pins 2, 7 and 10). When the Master-Reset pin is held Low (Logic 0), the output latches are asynchronously reset Low. With the Master-Reset pin High (Logic 1), data present at the input to the latch (D0 through D3) is latched and presented at the output pins, Q0 through Q3, when the clock input (CP at Pin 9) makes a transition from Low to High. The clock input is generated by IC3, a 74LS10.

IC3 is a triple, three-input NAND gate. This IC, along with the Read/*Write, E and *SCS signals generated by the Color Computer at pins 18, 6 and 36 of connector P1 determine the proper time to latch data into IC1. If you are familiar with the 6809 microprocessor, the 74LS10 NAND gate and the design of the Color Computer, you can see that the output of IC3 (Pin 8) goes low

at the beginning of the leading edge of the E clock during a write cycle and when the *SCS strobe is Low. At the end of the write cycle, this output changes from Low to High, allowing the data at the input pins of IC1 to latch together.

Now that each of the ICs have been identified, let's see how they all work together to form the Super Program Pak. When the Color Computer is first turned on (or if the Reset button is pressed), the Reset signal (Pin 5 on connector P1) goes Low. This causes IC1, the quad latch, to force its outputs D0 through D3 Low. Therefore, the Output Enable, A14 and A15 inputs of IC2 (the EPROM) are also Low. At this point, the first (or lowest) 16K page of the 64K EPROM may be read, starting at Address \$C000 through the remaining address inputs A0 through A13, assuming the Color Computer is in the external ROM mode.

After a reset, BASIC performs an initialization sequence to determine if a cartridge is installed in the cartridge slot. This is accomplished via an interrupt generated through the *CART signal at P1 Pin 8. When this occurs, BASIC, already initialized in the 16K internal/16K external ROM mode, simply jumps to Address \$C000. However, Color Computer 3 BASIC copies itself into RAM during initialization and changes the configuration of the Color Computer to the all-RAM mode. Therefore, when the *CART interrupt is detected, it must reconfigure the Color Computer 3 for the 16K internal/16K external ROM mode and jump to the routine at Address \$C000.

In either case, from this point on the program in IC2 must control the operation of the Super Program Pak. Initially, the program copies itself into a safe, or *non-paged*, area of the Color Computer's RAM and jumps to the copy in RAM.

Once in RAM, the program is free to select any of the four 16K pages (pages 1-4) of IC2 via a write to Address \$FF40. For example, to select Page 2, the second 16K page, use the following lines of assembly language code:

```
lda  #$01
sta  $FF40
```

To select Page 4, the fourth 16K page, use the following lines of code:

```
lda  #$03
sta  $FF40
```

Software Techniques

We have now doubled the Program Pak capacity from 32K to 64K bytes, yet we still haven't attained the mega-bit capacity found in some of the other game cartridges. The next step is to increase the efficiency of

BEST PUBLIC DOMAIN PROGRAMS !

FROM T&D SUBSCRIPTION SOFTWARE

"Great service and great software"
Jim Garner
Ft. Worth, Tx

T&D SUBSCRIPTION SOFTWARE HAS ACCUMULATED OVER
1,000 PUBLIC DOMAIN PROGRAMS FOR THE COLOR COMPUTER.
WE ARE SELLING 630 OF THE BEST. JUST THE GOOD STUFF !

"Your programs
are the greatest!"
Christine Rapoza
Tiverton, RI

Music 1-7

- M1 - 8 Utilities & 8 Songs
 - M2 - 17 Musica Files
 - M3 - 16 Musica Files
 - M4 - 16 Musica Files
 - M5 - 25 Orchestra Files
 - M6 - 23 .Bin Files Ready To Run
 - M7 - 23 .Bin Files Ready To Run
- Requires Musica



ADVENTURES 1,2

Each Disk/Tape Contains
9 Great Adventures
Ready To Run

Order A1 Or A2



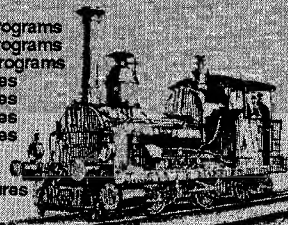
TELECOMMUNICATIONS 1-3

- T1 - Haysae, Kermit, Mikeymem, TeleTerm
- T2 - Cobbs BBS Terminal Package
- T3 - GETERM Communications



GRAPHICS 1-14

- GR1 - 12 Basic Graphic Programs
- GR2 - 12 Basic Graphic Programs
- GR3 - 9 Coco 3 Graphic Programs
- GR4 - 22 Coco Max Pictures
- GR5 - 22 Coco Max Pictures
- GR6 - 22 Coco Max Pictures
- GR7 - 15 Coco Max Pictures
- GR8 - 22 .Bin Pictures
- GR9 - 22 .Bin Pictures
- GR10 - 14 Large .Bin Pictures
- GR11 - 8 Mge Pictures
- GR12 - Coco Max 3 Pictures
- GR13 - Macpaint Graphic Editor
- GR14 - 5 Macintosh Pictures



** See Our Ad Containing 250 Graphic Pictures Elsewhere In This Magazine

EDUCATION 1-4

- E1 - 12 Programs For Young Kids
- E2 - 12 Programs For High School Kids
- E3 - 11 Programs Teaching The Coco'S Commands
- E4 - 5 Graphics Programs About Australia

HOME MANAGEMENT 1-4

12 Programs Each Disk/Tape

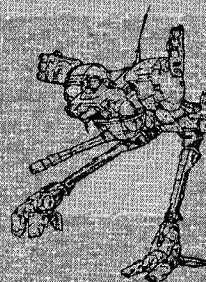
- H1 - Bargraph, Calendar, Financial Advice, +
- H2 - Charts, Last Will, Planets, +
- H3 - Finance, Stocks, Typing, +
- H4 - Spelling Fix, Spelling Checker, +



GAMES 1-11

Each Disk/Tape Contains 12 Programs

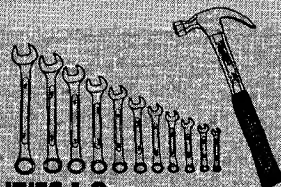
- GA1 - CarRace, Horses, RoBo Dice, StarTrek, +
- GA2 - BoBo, Chess, Rubic, Yahtzee, +
- GA3 - Backgammon, Gremlin, Python, Robots, +
- GA4 - Hawks, Saucer, Shootem, Trek, +
- GA5 - Battleship, Chicken, Raceway, Squash, +
- GA6 - Fly, Navy Guns, ShipSub, Tanks, +
- GA7 - Connect4, F-16, Pizza, Trek, +
- GA8 - Football, Leaky Tap, Poker, SubHunt, +
- GA9 - Battle, Chick Flight, Prix, +
- GA10 - Blockade, Fly, Missile2, Pong, +
- GA11 - Bunker3, Guadal, Martians, Traders, +



UTILITIES 1-8

12 Programs Each, 1-4 Require Disk

- U1 - Dir32, DiskZapper, RomCopy, Snap Edit, +
- U2 - Backup, Diskfix, Labeler, Multback, +
- U3 - Convert ML, MLdata, PlayMac, SendDisk, +
- U4 - Bin-Bas, PixConv, Unarc, VuMaster, +
- U5 - Assemblr, Graph, McBase, Recover, +
- U6 - Clock List 32, MiniDos, Pixcomp, +
- U7 - Head Print With 30 Mini Pictures
- U8 - Fig Forth Language With Tutorial



**BUY ALL 53
DISKS/TAPES FOR
ONLY \$145.00 !**

MAIL TO:

T&D Subscription Software
2490 Miles Standish Drive
Holland, Michigan 49424
(616) 399-9648

Call or write for a FREE catalog !

PRICES:

1- 5 disks/tapes...\$6.00 each
6 or more.....\$5.00 each
All 53 disks/tapes \$145.00



WE SEND 1ST CLASS - NO CHARGE

PERSONAL CHECKS WELCOME

Name _____

Address _____

City _____ State _____ Zip _____

Credit Card # _____

Expires _____

TOTAL AMOUNT \$ _____

CIRCLE ISSUES DESIRED

M1	GR1	E1	U1	GA1
M2	GR2	E2	U2	GA2
M3	GR3	E3	U3	GA3
M4	GR4	E4	U4	GA4
M5	GR5		U5	GA5
M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
A2	GR10			GA10
	GR11			GA11
T1	GR12			
T2	GR13			
T3	GR14			

PLEASE CIRCLE

TAPE

DISK

how we use the ROM so that it appears as if mega-bit capacity is available.

Several applications use data compression to reduce data storage requirements and/or transmission time. Data compression attempts to reduce the size of a block of data so it can be stored in less space or transmitted in less time. Once stored or transmitted, a decompression routine is used to restore the compressed data to its original state.

Data compression techniques vary in speed, complexity, size and efficiency. Indeed, some compression programs implement a number of compression techniques on a program or data file, then select the technique resulting in the greatest compression. One of these techniques, known as *run-length encoding* (RLE), is a common technique for compressing data. In its simplest form, RLE can be implemented in a very small and fast program, yet it provides a rather high degree of data compression.

To explain run-length encoding and to see how it compresses data, let's assume we want to save a Color Computer 3 graphics screen on disk. Let's also assume the graphics screen is a 16-color display, 160 pixels (80 bytes) wide, and 192 lines tall. And for simplicity, our final assumptions are that the top half of the screen is solid white, the bottom half is solid black, the palette register for white is Register 01, and the palette register for black is Register 00.

To save a screen of this size directly to disk without compression requires $160/2 * 192$ or 15,360 bytes of disk space (that's more than 90 percent of a 16K Program Pak). However, by examining the screen you can see there is a large section of white on top and a large section of black on the bottom. Instead of saving each of these large sections byte-by-byte, you can count the number of white pixels, save the count and color as a code, then count the number of black pixels and again save the count and color as a code. Using this technique requires only six bytes to represent the entire screen. For example, the top half, or white section of the screen, is 80 bytes wide and 96 bytes tall. Thus if we save the color code for white (01 in our example) as a single byte, followed by a two-byte representation of the byte count ($80 * 96 = 7680$), we can reduce the storage requirement from 7680 bytes to three bytes. The same process is repeated for the bottom half, or black section of the screen. Therefore, the entire screen is reduced from the original 15,360 bytes to six bytes, or 1/2560th of its original storage requirement.

A routine to perform the compression executes the following steps: First, the routine sets a pointer to the address of the

	lda	scrnaddr	get screen address in Register X
loop1	lda	,x+	get the color byte
	ldy	#1	initialize ocunt
loop2	cmpa	,x+	next byte match?
	bne	loop3	no
	leay	1,y	yes, count is now + 1
	cmpx	scrnend	have we hit the end of the screen?
	bne	loop2	no
loop3	lbsr	writocol	write A, the color byte
	lbsr	wrotecby	write Y, the count bytes
	cmpx	scrnend	did we hit the end of the screen?
	blo	loop1	no, continue
endloop	equ	*	

Figure 2: Sample Compression Routine #1

	ldx	scrnaddr	get screen address in Register X
loop1	lbsr	readcol	read color byte into Register A
	bcs	endloop	readcol detected end of file, end
	lbsr	readcnt	else, read bytecount into Register Y
loop2	sta	,x+	write color, update pointer
	leay	-1,y	continue until byte count is zero
	bne	loop2	
	bra	loop1	then get the next color
endloop	equ	*	

Figure 3: Sample Compression Routine #2

upper left-hand corner of the graphics display. Next, the routine reads the byte at the pointer, bumps the pointer to the next byte, then initializes a counter to 1 (indicating one byte of this color has been determined). A loop then enters to compare the next byte. If the byte is the same, the counter is incremented by one, and a test is performed to ensure the routine has not exceeded the screen limits. If the byte differs, the current color and count are saved to disk, followed by another check on the screen limits. If the end of the screen has not been reached, the routine continues with the new color byte. An assembly language example of the compression routine appears as shown in Figure 2.

A decompression program is now required to restore the compressed screen file to its original state. First the decompression routine sets a pointer to the address of the upper-left hand corner of the graphics display. Next it reads the first byte of the compressed screen from the disk, this being white in our example, followed by the next two bytes, the byte counter. A loop then enters to store the color byte at the current pointer address, increments the pointer address, decrements the byte counter and continues until it reaches zero. When all the color bytes are stored, the next color byte

and byte counter are read from the disk and the process continues. If you reach the end of the disk file, the process ends and the compressed screen is restored to its original state. An assembly language version of this routine appears in Figure 3.

In this example, the compression/decompression routines performed quite well, resulting in a very impressive degree of compression. However, as we will see, these simple routines can actually produce a compressed file larger than the original file.

Let's change our assumption a little by saying that the screen consists entirely of alternating white and black pixels (the first pixel is white, the second is black, the third is white, etc.) The compression routine starts at the top left-hand corner of the screen and finds a white pixel. It then initializes the byte counter to 1 and starts counting the subsequent white pixels. However, at the very next byte it finds the color black, so it saves the white color pixel and the counter (containing a count of 1) to the disk, then starts compressing black pixels. Again, at the very next byte, it finds a different color (white), so it writes the black color pixel and the counter (again containing a count of 1) to the disk, then starts compressing white pixels. But on the

very next byte — well, you get the picture. The final result is that for each byte on the screen the compression routine saves three compressed bytes, one for the color code and two for the count. Thus we require three times (or 46,080 bytes) the amount of storage on the disk as is required if you simply save it byte-by-byte. Fortunately, we can do better.

A Better Decompression Technique

Just as there are various techniques for compressing data, there are various techniques for run-length encoding and decoding. The techniques described here involve distinguishing between single-byte runs of data (the type that caused the problem in the earlier design), and multi-byte runs (multiple bytes of the same type) of data. It accomplishes this by establishing a coded run type, which informs the decompression program that either a single byte or a run of bytes has occurred. (Although normally quite efficient, this simple technique can produce inefficient results under certain conditions. See if you can determine the conditions, or better yet, how to avoid them.)

The coded-run byte contains an arbitrary two-bit code in an arbitrary position within the byte. For our discussion, let's

assume the arbitrary two-bit code resides in the upper two bits of the coded-run byte. The remaining six bits in the coded-run byte have different meanings.

Now let's assign definitions to the bit patterns of the two-bit code in the coded run byte. These two bits are defined in Table 1.

Note that if the upper two bits, bits 6 and 7, are set to 1, this indicates a multi-byte run. In this case the lower six bits of the coded-run byte contain a count, from 0 to 63, of the number of bytes to be duplicated. In the case of a multi-byte run, the byte immediately following the coded-run byte will be the byte to duplicate (the color byte in the earlier example).

If the upper two bytes contain any of the remaining three patterns, then the byte is a single-byte run and is a copy of the single byte found during the compression process. In other words, a byte not containing the bit pattern 11 in the upper two bits of the byte is simply copied to its destination.

Using this technique let's decompress the following run length encoded data:

\$C3,\$00,\$AA,\$C5,\$55,\$C0

The first byte, \$C3, contains the bit pattern 11 in the upper two bits, indicating a multi-byte run. The lower six bits contain

the bit pattern 000011 that represents the count, in this case three. The byte immediately following is the byte to duplicate, \$00. Therefore, the first three bytes in our decompression process are:

Bytes:	1	2	3
Data:	\$00	\$00	\$00

Skipping over the first coded run byte and the duplicate byte, the next byte, \$AA, does not contain the multi-byte run code in the upper two bits. Therefore it is a single byte and is simply added to the decompressed list, which now appears as follows:

Bytes:	1	2	3	4
Data:	\$00	\$00	\$00	\$AA

The next byte, \$C5, represents a multi-byte run, but this time it indicates five occurrences of the duplicate byte \$55. What we now have is shown in Table 2.

Now we come to the final byte, \$C0, which is a special case of the multi-byte run. In this case the count is 0, which indicates the end of the compressed data and therefore the end of decompression.

Analyzing the results of our simple example, the six bytes of compressed data were decompressed into eight bytes of data.

COMPUTER ISLAND EDUCATIONAL SOFTWARE PROGRAMS ON SALE THIS MONTH

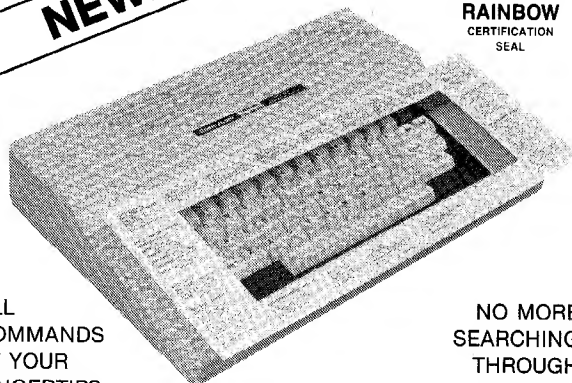
\$15 each-tape or disk

Spanish Baseball
French Baseball
Cloze Exercises-Grade 3,4,5,6 or 7
(Please Specify Grade)
Context Clues- Grade 2-3,4,5,6,7
(Please Specify Grade)
Chemistry Tutor
Graph Tutor
Graph-It (algebraic equations)
Punctuation Practice
Story Details-Grade 2-3 or 4-5
(Please Specify Grade)
Drawing Conclusions-Grade 3-4 or 5-6 (Please Specify Grade)
Math Quiz

COMPUTER ISLAND
227 Hampton Green
Staten Island, NY 10312
(718) 948-2748

Add \$1.00 postage, NY res. add tax
VISA, MC - Send for free catalog

NEW!!!



ALL
COMMANDS
AT YOUR
FINGERTIPS

NO MORE
SEARCHING
THROUGH
MANUALS

KEYBOARD TEMPLATES FOR YOUR COCO

ALL Commands for CoCo 1-2-3
on ONE Template \$6.95
Telewriter 64 Template 5.95
Telewriter 128 Template 5.95

Please add \$2.00 Shipping & Handling for each Template

(NC Residents Add 5% Sales Tax)

PLEASE SEND CHECK OR MONEY ORDER ONLY

P&M PRODUCTS

1003 Shalimar Drive
High Point, North Carolina 27262
(919) 887-2236

Although that doesn't seem like much, the resulting compression saved two bytes, or 25 percent of storage. When applied to the Super Program Pak, 25 percent of 64K bytes is 16,384 bytes, or one-fourth of the uncompressed capacity of the ROM.

Now let's write some code that performs the decompression process. The assembly language code shown in Figure 4 decompresses data that has been compressed in the format we have just discussed. As you can see, the decompression subroutine is quite small, which, when used in a Program Pak environment, is exactly what we

need. This small program, along with the compressed data, can and does save literally thousands of bytes of storage. In a Program Pak environment, this extra storage results in larger, more complex games and high-quality digitized graphics images.

A compression program is substantially larger in size. However, that does not concern us since the compression process happens outside of the Program Pak environment, under OS-9, for example. It does not have to be small or even fast. The program can be written in BASIC, C or some other higher-level language.

The Results

Does it work? You bet! The Super Program Pak made its debut with the release of two new Color Computer 3 products.

The first, developed by ZCT Systems Group for Activision, is *Predator*. It was with close cooperation between Activision, Tandy and ZCT Systems Group that *Predator* and the first Super Program Pak were developed. *Predator* features digitized bit-image graphics, full-screen horizontal scrolling in the Color Computer 3, 160-by-225 16-color graphics mode, sound effects and a whopping total of 53 stages and sub-stages.

The second program developed by ZCT Systems Group for Data East is *RoboCop*. It features digitized bit-image graphics, full-screen horizontal scrolling in the Color Computer 3, 160-by-200 16-color graphics mode, sound effects and a total of 31 stages and substages. *RoboCop* also features highly-detailed background graphics. Over half of the 128K Super Program Pak is dedicated to the background graphics and sprites. Considering the average compression ratio for *RoboCop* data exceeded 6 to 1, over 384K bytes (3 mega-bits) of data is required for the game.

Where Do We Go From Here?

The Super Program Pak is designed to facilitate the use of either 64K by 8-bit or 128K by 8-bit ROMs. If you have the chance to see *Predator* or *RoboCop*, we are sure you'll agree that the complexity and graphic detail available in these games using the Super Program Pak and extensive data compression is right up there with the video-game-only counterparts.

However, the Super Program Pak II is now able to provide 512K-by-8 bit, 1024K-by-8 bit, and even greater ROM storage. By adding a sound processor, the possibilities are even greater since the newer Color Computer games using the Super Program Pak II should easily surpass the video-game-only counterparts.

Where we go from here depends on the interests of the Color Computer Community. ZCT Systems Group has been committed to serving the interests of the Color Computer Community through the development and production of Color Computer-based educational, personal productivity and entertainment programs. And thanks to the support of Tandy, Activision and Data East USA, that commitment continues with the release of *Predator*, *RoboCop* and the Super Program Pak series. If your response to this series is good, I'm certain you won't be disappointed with what's next.

Bits								Definition
7	6	5	4	3	2	1	0	
0	0	X	X	X	X	X	X	not a multi-byte run
0	1	X	X	X	X	X	X	not a multi-byte run
1	0	X	X	X	X	X	X	not a multi-byte run
1	1	X	X	X	X	X	X	multi-byte run

Table 1: Bit-Pattern Definitions

Bytes:	0	1	2	3	4	5	6	7	8
Data:	\$00	\$00	\$00	\$AA	\$55	\$55	\$55	\$55	\$55

Table 2: A Multi-Byte Run

```

*
* decomp
* decompress run length encoded data
* entry : register X points to start of compressed data
*       : register U points to destination
* exit  : registers restored
* calls : none
*decomp equ      *
    pshs d,x,y,u save registers for return
*
decomp1 lda      ,x      single or multi-byte run?
    anda #$C0
    cmpa #$C0
    beq decomp3
*
decomp2 lda      ,x+     single, simply copy the byte
    sta ,u+           and update the pointers
    bra decomp1 then continue
*
decomp3 ldb      ,x+     multi, get count, update pointer
    andb #$3f
    beq decomp9 end of compressed data if count = 0
    lda ,x+           get duplicate byte, update pointer
decomp3a      sta ,u+     duplicate register A,
    decb          register B times
    bne decomp3a
    bra decomp1 then continue
*
decomp9 puls     d,x,y,u,pc restore registers, return to caller

```

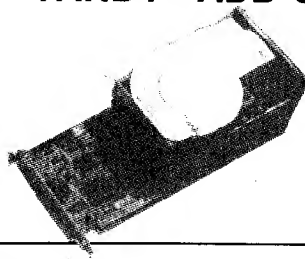
Figure 4: Decompression Routine



**SPECIAL
OF THE MONTH
DRIVE CARDS**

For model 1000, SX, TX, SL, TL, 3000, 3000NL

TANDY® ADD-ONS



20 Meg Drive Card	65 MS	\$269.95
20 Meg Drive Card	45 MS	\$289.95
32 Meg Drive Card	45 MS	\$299.95
40 Meg Drive Card	60 MS	\$339.95
49 Meg Drive Card	32 MS	\$399.95
64 Meg Drive Card	23 MS	\$539.95

Call for current pricing



**TDP/2
\$699.95**

30-Day
Money Back Guarantee -
you can't lose!

TDP/2 versus Tandy® TL/2
(Comparison Chart)

TDP/2

- 12 MHz 80286 Processor
- Built in hard drive controller (IDE interface supports up to 2 hard drives)
- Built in floppy drive controller supports 1.2 Meg, 1.44 Meg, 720K, 360K floppies
- Built in printer port
- Built in 2 serial (RS232) ports, COM1, COM2
- Joystick port
- 512K memory expandable to 8 Meg
- 1.44 Meg floppy drive
- Video supports Hercules® monochrome graphics and CGA color graphics
- 7 slots, 6 - 16 bit, 1 - 8 bit
- 200 watt power supply
- Real time clock
- 101 enhanced keyboard (click)
- Math co processor socket
- 3 (MT S) drive bays
- Software - PC Write, PC Calc, PC File
- EZ DOS

Tandy® TL/2

- 8 MHz 80286 Processor
- Built in hard drive controller (IDE interface)
- Built in floppy drive controller supports 720K, 360K floppies
- Built in printer port
- Built in serial port COM1
- 2 joystick ports
- 640K memory expandable to 768K
- 720K floppy drive
- Video supports Hercules® monochrome graphics and CGA color graphics
- 5 8 bit slots
- 67 watt power supply
- Real time clock
- 101 enhanced keyboard
- Math co processor socket
- 3 drive bays
- Software - Desktop® 3 Productivity
- MS DOS

TDP/2 Options:

• 12" monochrome monitor	\$89.95	• 1.44 Meg floppy	\$119.95
• 14" CGA monitor	\$279.95	• 720K floppy	\$99.95
• 14" EGA monitor & card	\$499.95	• 360K floppy	\$99.95
• 14" VGA monitor card	\$599.95	• 20 Meg drive	\$279.95
• 1.2 Meg floppy	\$119.95	• 40 Meg drive	\$349.95

External Hard Drives for Tandy® EX, HX Computers

Complete System - just plug in (requires 384K min.)

20 Meg	\$389.95	30 Meg	\$429.95
40 Meg	\$499.95		

Now we carry IDE Drives for new Tandy®s

20 Meg - CALL 40 Meg - CALL

100, SX, TX, SL, TL, 3000, 4000

2nd Floppy

360K	TEAC	\$119.95
720K	Mitsubishi	\$99.95
3 1/2"	Mitsubishi	\$119.95

1000, SX, TX, SL, TL

Hard Drive Controller

Will run 1 or 2
Hard Drives

Supports drives up to 120 megabytes

\$99.95

1000, 1000A

Memory Board with 512K

Expands memory to 640K

\$199.95

1000, SX, TX, SL, TL, 3000, 4000

Memory Upgrades

From

\$50

Tandy® EX, HX

360K or 720K External Floppy

For EX or HX

\$139.95

Tandy® EX, HX

External Hard Drive

10 Meg	\$299.95
20 Meg	\$389.95
30 Meg	\$429.95
40 Meg	\$499.95

Tandy® EX, HX

384K Memory Expansion Card

Includes 384K

\$189.95

Color Computer

Drive O

Includes floppy drive, case & power supply, controller & software

\$179.95

Tandy® 1400 LT

360K External Floppy

\$199.95

Tandy® 1400 LT

720K External Floppy Drive

\$199.95

Tandy® 1400 LT

20 Meg Internal Hard Disk Drive

\$699.95

Color Computer

Drive O + 1

Includes 2 floppy drives, case & power supply, controller & software

\$269.95

Tandy® is a registered trademark of Tandy Corporation

TRUE DATA PRODUCTS

P.O. Box 347, 115 So. Main Street
Uxbridge, MA 01569

Tel. 508-278-6555
1-800-635-0300

Hours: 9 a.m.-6 p.m., Sat. 10 a.m.-4 p.m.



1ST QUALITY
MERCHANDISE
QUALITY
CUSTOMER SERVICE
508-278-6555
TECHNICAL ASSISTANCE
508-278-6556
FOR YOUR PROTECTION
WE CHECK FOR
STOLEN CREDIT CARDS.

CORPORATE P.O.'s WELCOMED

ALL PACKAGES SHIPPED UPS EXCEPT CANADA
AND A.P.O.'s. C.O.D.'s ADD \$3.30. MASTERCARD/
VISA ADD 2%

ALL RETURNS MUST HAVE RMA# (CALL 508-278-
6555). YOU MAY BE SUBJECT TO A RESTOCK-
ING FEE. SHIPPING/HANDLING CHARGES
NON-REFUNDABLE

1 YEAR WARRANTY UNLESS OTHERWISE NOTED.
PRICES/TERMS/CONDITIONS SUBJECT TO
CHANGE WITHOUT NOTICE



Software

512K CoCo 3

Those Darn Marbles— Enough to Make You Lose Your Marbles

I promised myself I would not sit down to write this review until I had cleared the second level of *Those Darn Marbles* and gotten a glimpse of the much-craved third level. I had to break that promise to myself, because I simply *cannot* clear the second level — and there are six levels in this game. I've sat in front of the computer until my seating apparatus becomes numb, and I've maneuvered my joystick until my fingers grow stiff and uncooperative. I've come heartbreakingly close, but no cigar.

What is this game that drives normally sane and sober people to madness, haunts their dreams at night and reduces a working day's productive output? It's *Those Darn Marbles* from Oblique Triad, an exciting 3-

D, 512K game for Color Computer 3s, based on the arcade game *Marble Madness*. To play you'll need a 512K CoCo 3, a disk drive and a joystick. The game comes on four disks: a boot disk, a special effects disk and two level disks. The boot disk is copy-protected, but the rest are not.

Don't be put off by my inability to reach Level 3 — as arcade players go, I am an average Joe (Jane, actually). For you joystick jockeys, reaching Level 3 may be an exercise in effortlessness.

In *Those Darn Marbles*, the object of each level is to guide a marble down a maze of high ramps and passageways to a goal area marked END — in a given amount of time. The clock is always counting down.

The END goal is flanked by waving flags, to give the appearance of entering a castle. Let me tell you, if you complete a level you feel worthy of a royal reception. Of course, I've only successfully completed one level.

Gravity and inertia are forces to be reckoned with in the universe of *Those Darn Marbles*. To move the marble, you press the joystick in the direction you want it to go. Nothing could be simpler, except . . . instead of the regular up/down/left/right joystick control, you move the stick in 45-degree increments to keep on an even keel. Pull the joystick straight up, down, left or right in your exuberance, and you are likely to go careening off the edge of your path into a very deep chasm.

Your marble does not like to fall, whether into chasms or off a dropoff to a lower level. It lets you know this: The marble has a face, you see. When it is happily rolling along, the marble wears a silly grin. When it falls off into space, it takes on a most pathetic panic-stricken expression. And

when it clunks off a dropoff its eyeballs roll around and it becomes generally disoriented (and when the marble becomes disoriented, you can't control it with the joystick). You can't run out of marbles; you can only run out of time. When the marble falls off the edge (or gets sucked up by "acid pools" — but we'll get to that later), you lose precious seconds.

Say you push the joystick to go left — the marble goes left. If you let off the joystick, the marble continues to roll for a little ways. So, unlike in the *Pac-Man* games, you can't stop on a dime and run in another

direction. This takes some getting used to — this and the strange joystick orientation. It will take you probably more than an hour to become accustomed to joystick control. But the process is a lot of fun!

The area the marble rolls over consists of grid squares. Once I figured out that holding my joystick at the correct angle would let me travel aligned with the grid lines, my score improved. The grid lines and squares help you judge where you should be and where you're going.

Besides gravity, you and your marble need to be concerned about Marble Munch-

ers, Jehosaphats and Acid Pools, which are "sentient bottomless pits that roam around, seeking to dissolve your marble into a pile of scrunge." In my experience so far with the game I have not encountered Marble Munchers or Jehosaphats, which the manual describes as being troublesome. But I have been dissolved countless times by the Acid Pools, and it's a time-consuming and unpleasant process.

There is a "magic wand" that sometimes appears and grants you 10 additional seconds in a round, but it is maddeningly random: In the more than 40 games I've played, I've seen the thing only three times. Also, the manual mentions hidden passageways and secret bridges, but I have yet to find any.

The author's sense of humor takes the game beyond being just an excellent arcade challenge. The marble itself — with that silly grin — is hilarious. There are other little humorous touches that add to the game. For instance, on the first level, there is graffiti on the wall stating "Elvis is buried here." (So pay no attention to those people who keep claiming to see him at Burger King.) On the high-score screen, if you mess up typing your name and press the backspace key, the game makes a cute boing-boing nose. It's the humorous little touches that make me really want to see what's beyond Level 2.

Speaking of boing-boing noises, the game is full of interesting sounds. As you would expect of a game requiring 512K, the graphics and sound effects are excellent. There is digitized speech and the graphics, about the best I've seen on any CoCo game, are colorful, clear and detailed. The animation and screen scroll are smooth.

The game screen deserves particular note because, according to Oblique Triad's advertisement, it is controlled by hardware — not by software. If this is a sample of what 512K can do on the CoCo, I really look forward to the release of more games to take advantage of this power.

I won't be satisfied until I see the third level. So after I save this file I guess it's back to the arcade for me. In case you haven't guessed, *Those Darn Marbles* is very addictive.

(Oblique Triad, 32 Church St., Georgetown, ON L7G 2A7, Canada, 416-877-8149; \$32 U.S., \$38 Cdn., plus \$2.50 S/H)

—Carol Hartman

A Talk with the Programmer, Jeff Noyle

Q. *Why did you program Those Darn Marbles for 512K machines, and what do you think of the 512K market?*

A. There's a pretty healthy 512K market from my experience. Whether that's just people trying to justify their 512K machines is another matter. Hardware scrolling is the reason *Those Darn Marbles* requires the 512K — 380K is reserved just for screens. I started coding *Those Darn Marbles* about a year-and-a-half to two years ago. I first tried to squeeze the hardware scrolling into 128K, but I gave up.

Q. *How did you get the idea for Those Darn Marbles?*

A. I had looked into the capabilities of hardware scrolling and figured something using the techniques would be fairly impressive. I was also a fan of the Amiga version of *Marble Madness*, and I felt it could be done as well on the CoCo.

Q. *How did you incorporate those fancy sound effects into the game?*

A. *Studio Works* was used exclusively to digitize the voices and sounds, and I supplied the voices. I did a Mickey Mouse imitation: I spoke with my voice as high as I could, then I slowed it down so that it sounded natural but a little stretched out.

The "boinks" you hear when the marble falls off a path is the sign-on sound from a Macintosh computer. When

you bounce off walls, the "bong" sound you hear is produced by a sitar, a Hindu lute.

Q. *The program comes on four disks. Isn't that a lot of code for just a few disks?*

A. It used to take eight disks, having a disk for every level. I compressed the files using Hoffman encoding.

Q. *This game is really funny — a refreshing break from kill-'em-dead arcade games! What prompted the "graffiti"?*

A. I call it "Planet of Enquirer Graffiti." The whole idea of the game is a silly, non-violent romp, if you will. Violence is becoming too prevalent in computer games. But I did *Overlord*, a military simulation, so I'm not one to talk. If the violence is abstract, obviously fantasy, then it's OK.

Q. *What can we expect to see next from you and your partner, Dave Trigger-son?*

A. We are presently revising *Studio Works*, and we may have more games available later in the year, around September. I have no immediate plans for another 512K game. *The Winds of Orion*, a 3-D space flight simulation, is in the works. Whether it comes to fruition or not is not carved in stone. I hope to squeeze it into 128K.



Div and ConDiv — Divide and Conquer!

As a volunteer in an elementary school, I help students all day. Part of my job is helping them with division problems. It's a tough job, but somebody's got to do it. Fortunately I like math — particularly division. However, sometimes I could use a little extra help doing it. *Div* and *ConDiv*, by XYORN, are two educational tutorials that address this need. You begin by typing in RUN DIV. As the program runs, it automatically loads *ConDiv*. *Div* creates white-on-black characters on my CM-8 monitor, which is similar to a chalkboard. It uses PMODE 4 DRAW strings to place letters and numbers on the screen, with provision for up to 36 columns.

The first menu allows you to create a computer-generated example, work on your own problem or work a computer problem. For example, let's say you have 1735/12. The computer performs each division step by step, instructing you as to which keys to press to find the quotient.

The program waits for you to press the correct key before continuing. It shows you exactly where each digit should be placed. Remainders, if any, are dealt with in one of two ways: They can be left at the end of the problem or taken out to several decimal places. Remainders are not placed after the quotient, as in traditional division.

When you finish, the program returns to the main menu. Next, try doing your own problem, but remember that upper limits for the numerator and denominator are built-in so problems won't become too long on the screen. Again, find the answer on paper, then watch as the CoCo presents how to find the answer.

Working out your own problem and letting the computer choose the problem basically involves the same procedures. When it finishes finding the whole number part of the answer, the program asks if you either want to find the decimal part or do another problem.

The program includes an onscreen tutorial, but it's only available as instructions: You can't work your own problems on the screen or place digits into the quotient — the computer does that. You must work out your own problems manually (on paper) and compare your answer with the program's. But why go to all that trouble when the computer will do it for you?

I was unable to back up the disk, yet I

could copy both files to another disk. No manual is supplied (or needed) to run the programs, but there are full onscreen instructions.

I found a few flaws with *Div* and *ConDiv*. For instance, they both have trouble taking a larger denominator into a smaller numerator, as 9/48.

Since the programs are in BASIC, I listed *ConDiv* and discovered an error in Line 592. It states: 'IF C<100 THEN 5770 ELSE. Why is that line there? If the apostrophe were removed, the line would crash the program! Another problem is you can't exit without pressing BREAK. When I tried to divide by 0, the program ended with an error. This should be modified to tell the user an error has occurred — not produce an error and end the program. Also, one screen message contains a misspelling.

I think *Div* and *ConDiv* are useful for third-graders or older. The built-in samples mainly use four-digit numerators divided by two-digit denominators. However, the student can enter numbers of various sizes.

(XYORN, H. Fairchild, 43611 Serenity Court, Lancaster, CA 93535; \$19.95)

— Lee Deuell

Software

CoCo 3

Omni Utility 2.0— The Taming of the Floppy Disk

In the July '89 issue of THE RAINBOW I did a review of *Omni Utility 1.0*. I was really quite impressed with *Omni*. It was well-written, did what it promised and was a good value. In fact the only improvement I could think of was the use of more than one drive when making backups. Well, now we have *Omni 2.0*, which not only allows the use of multiple drives but has other improvements that make it an even better value.

Omni 2.0 is a disk utility for the CoCo 3 written by Greg Wittmeyer, offered for sale by gsw software. *Omni* comes on an unprotected 5¼-inch floppy disk with a 10-page booklet that explains what each function does. When you boot *Omni* you'll see a good-looking title screen. At this point you insert the disk to be worked on into Drive 0 and press any key. Then the main menu is displayed. On the right side of the screen is a box that lists the files on the disk. Also in

the box are two asterisks: The file between the asterisks is the file to be worked on. The arrow keys are used to change the file between the asterisks.

The left side of the screen is a listing of 16 commands. To use a command, simply press the first letter of the command (I love a program this easy to use). Any time you want to work on a different disk, simply insert the disk and press BREAK, then the new directory will be in the box. Here is a list of the commands available:

Alphabetize: arranges the directory in alphabetical order

Backup: backs up disks (more about this later)

Copy file

Execute file: runs a file

Format disk (no more DSKINI!)

Information on disk: lists name, extension, type of file, format, length and which granules on the disk the file occupies

Kill file

List file: lists file to screen or printer

Move file: moves file to another disk or directory

OK disk: checks any or all tracks and sectors for errors

Print directory

Quit

Rename file

Sector editor (more on this later)

Update directory (use after you rename/kill/move a file)

Verify two files: checks two files (up to 64K each) to see if they are the same

When Backup is selected, another menu appears with six options (now for some new stuff). The user can choose from 0 to 3 for target and source drives (if he has a multiple-drive system), or stay with Drive 0 on single-drive systems. Also you can choose whether to back up an entire disk or just the granules used, which saves a lot of time. And if that is not enough you can also back up any part of a disk by giving *Omni* the beginning and ending track and sectors.

Another command that needs more explanation is the sector editor, which allows the user to scan an entire disk and make changes. When this command is chosen you are given five operations: toggle ASCII, jump to a different track and sector, modify sector, print sector to printer, and quit to return to main menu.

Also, the arrow keys can be used to jump to different sectors or granules. With the Sector Editor command the user can actually go into a file on disk and make changes in it (providing he has knowledge of the language in which it is written). To sum up, I liked *Omni 1.0*, and I love *Omni 2.0*. *Omni* makes it so easy to keep my working disks

NEW!

Window Writer 1.2

What we believe to be the best word processor available for OS/9 just got better! You asked and we listened. We have added new features which the public has requested!

DYNASPELL 102K WORD SPELLING CHECKER NOW AVAILABLE!

More Versatile and Powerful. OS/9 Allows you Freedom and Power. The mouse and pull-down menus give you speed and ease of use.

Multi-Tasks

Window Writer is the first Color Computer word processor which takes full advantage of OS/9. The result is a word processor which is fully as modern and professional in action as those previously available only for the IBM and Mac. The operating system allows true multi-tasking with other programs or itself. Not limited to just printing one file and editing another. You can print one file in one window while you edit files in other windows. At the same time you can be running a small program in another window. You can cut and paste between sections of files in different windows.

Hi-Res Display

Window Writer uses an 80-column monitor display screen for clarity. As shown in the above screen drawing, you can quickly see how to access the menus and help screens. You can determine the current position by page, line number, and column. The mouse can use this section to quickly change to a specific page or line in the file. The text insert and word wrap toggles also are indicated and changeable with the mouse button.

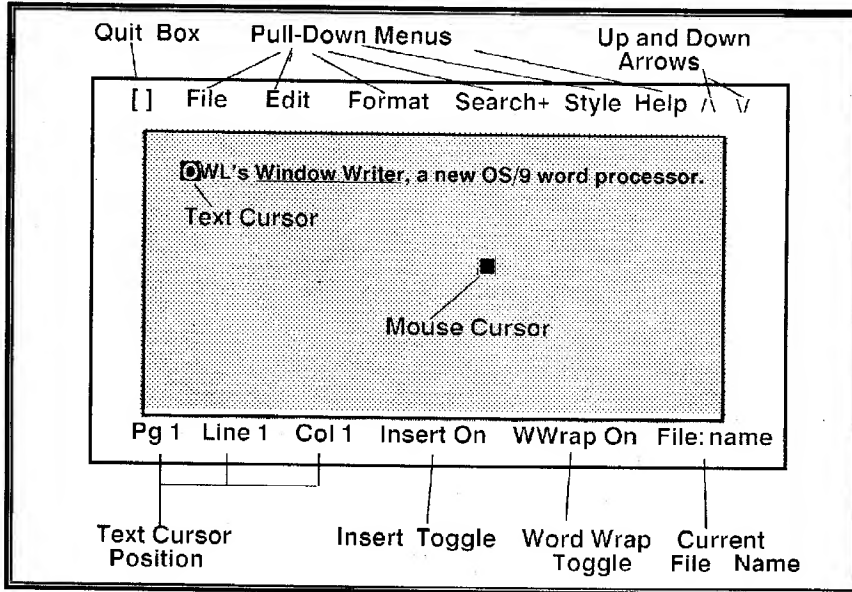
Ram Disk

A RAM disk is set up in **Window Writer** to make full use of all or a user specified portion of the memory on the 512K CoCo 3. On the 128K CoCo a smaller RAM disk is set up to still allow use of all available memory for file editing. For use of all features, a 512K machine is required.

The RAM disk is used for storage of the file(s) being edited, for the clipboard for cut and paste, and as a print spooler for the file being printed. **Window Writer's** clipboard can be saved to disk or pasted into any file being edited because files use the same clipboard memory. The RAM disk also can be used with other OS/9 programs.

Mail-Merge

With **Window Writer** you can create form letters and send them out to a list of addresses in an address file. First names or other information can be added to "personalize" these letters.

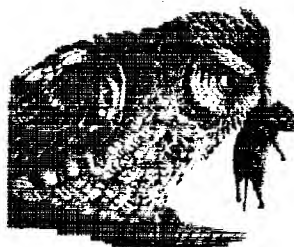


Pull Down Menus and Help Screens

A full selection of pull down menus and detailed help screens make learning easy and are only a key stroke (or mouse click) away. All menus and help screens can be user configured for everything including menu colors and contents. You don't like the color of a menu? You think one help item should be listed differently? Change them!

The menus and help screens can be reached by cursor keys or the mouse

(or joystick) or can be accessed by control keys.



Editing is a snap with OWL's Efficient Mouse Usage!

Editing

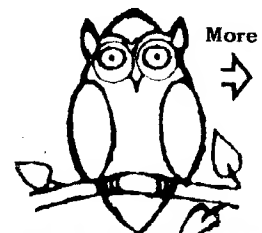
Like most modern word processors, with **Window Writer** there is always more than one way to access any editing feature. You can access editing by menus using mouse, "keyboard mouse", or through control keys. Full help screens are quickly available for all editing features. A help screen can be left visible while needed and then quickly removed to get back to full screen editing.

One nice feature is the price:

only \$59.

For the DynaSpell Spelling Checker by Dale Puckett including the 102K Word Dictionary:

only \$20. additional!



OWL-WARE

P.O. Box 116-A
Mertztown, PA 19539

— ORDER LINES (only) —
(800) 245-6228
(215) 682-6855 (PA)



Proven

On the Razor's Edge of

The Hard Drive's New Frontier:

The Most Advanced Color Computer Hard Drive System Ever Offered!

Fast No-Halt SCSI Floppies Using Optional SCSI Controller

Proven Performance for Demanding Home or Business Users

OWL-WARE has now been supplying Color Computer hard drive systems for over 4 years. We have reached our position in the hard drive market by providing our customers with a high quality product that they can be proud to own and use. Our first concern has always been quality and sound design.

We are now announcing our most advanced hard drive system ever. Using the optional OMTI 5200 SCSI controller with our Hard Drive Interface, our new system will support no-halt floppy drives. You need not wait while typing or worry about clock time losses. Why be limited to 3 floppy drives? A complete system could now consist of 1-3 standard CoCo floppy drives, 1-2 (or more) hard drives, and 1-2 no-halt floppies using standard (not just CoCo) OS/9 format. You can use single or double-sided 40 or 80 track drives with the SCSI no-halt controller.

There are several new features with this improved interface. These include:

- Full SASI/SCSI compatible (this allows many add-ons to the versatile SCSI buss)
- No-Halt Floppies with optional SCSI controller allows full type-ahead during access
- Low factory-direct prices
- Fast Delivery from factory stock
- Optional Real Time Clock with built in battery (3-10 year lifetime)
- With the Clock you have 240 Bytes of battery backed up RAM for password protection or data storage!
- Same super stable LRTech quality

Our quality is obvious when compared to any other Hard Drive system or interface. Even the box is special. Our systems have always had a fan. Has our competition just heard about them?

Interface Price only: **\$85.**

Real Time Clock-RAM: **\$25.**

20 Meg. 40 Meg. 80 Meg.
(2X40 Meg.)

System Prices: (Includes Hard Drive, case, & fan, SASI Controller*, LR/OWL Interface, Software. Fully assembled and tested.)

\$519. \$629. \$929.

Super System Prices: (LR/OWL System as above but OMTI 5200 SCSI Controller AND 3.5" 80 Track Floppy Drive in same case)

\$649. \$759. \$1099. (2 cases)

*SASI controller is unused surplus. Add \$75 for OMTI SCSI

Now Available with High Density 5.25" drives as well as 720K!

Disk Capacity of more than 1 Meg Formatted!

Same low price as our 720K super systems listed below.

OWL Hard Drive BASIC 3

There have been several ads in this magazine about BASIC for Color Computer hard drive systems. These ads sometimes only tell a part of the story. Our BASIC system price includes assembly, testing, and 3-day burn-in period. We do not require a Multi-pak to operate.

Our hard drive systems are fast, reliable, and reasonable in price. This has been proven by hundreds of users over the past 4 years. We do not have to turn off error checking for speed. We achieve high speed BASIC from a unique indexing method.

OWL HD BASIC 3 is very fast due to our index method. Almost all BASIC commands work normally including DSKINI, DSKI\$, and DSKO\$.

BASIC for Hard Drives
Prices: With/Without Hard Drive

\$35./\$79.

Technology

the Color Computer Frontier

DISK DRIVES

Bonus!
Special
Bundled
Software
with any
Disk Drive
Purchase!



Floppy Drive Systems

The Highest Quality for Years of Service

Drive 0 Systems (Half Height, Double Sided,

Direct Drives) **\$199.**

Drive 0 systems complete with drive, controller, legal DOS, cable, case, power supply, and manual

Drive 1 Systems (Half Height, Double Sided,

Direct Drives) **\$129.**

New 3.5", 720K Drives for OS-9 with case

& Power Supply **\$169.**

Drive 1 Systems have drive, case, power supply. (You may require optional cable and/or DOS chip to use)

Special for 0/1 Combos (Drives

0,1,2,3) \$295.

HALF-HEIGHT DRIVE UPGRADES FOR RS HORIZON- TAL CASES

Why only double the capacity of your system when you can triple in the same case? Kit includes: double-sided to fit your case, chip to run both sides of new drive, hardware, and detailed instructions. Easy! Takes only 5 minutes!

Model \$119. Model \$129.

500

501 or 502

All drives are new and fully assembled. We ship only FULLY TESTED and CERTIFIED at these low prices. We use Fuji, YE Data, and other fine brands. No drives are used or surplus unless otherwise stated to you when you order. We appear to be the one of the few advertisers in Rainbow who can truly make this claim. We have 5 years experience in the CoCo disk drive market! We are able to provide support when you have a problem.

Drives 1 Year Warranty

OWL Phones

Order Numbers (only)

1-800-245-6228

1-215-682-6855

Fax: 1-215-837-1942

Technical Help

1-215-837-1917

OWL WARE Software Bundle

Disk Tutorial/Utilities/Games

DISK TUTOR Ver 1.1

Learn how to use your disk drive from this multi-lesson, machine language program. This tutor takes you through your lessons and corrects your mistakes for a quick, painless disk drive introduction. (This professionally written tutor is easily worth the bundle's total price.)

3 UTILITIES

A copy verify, copy, and DOS utility.

2 GAMES

We will select 2 games from our stock. These are sold for more than \$20 each.

Do not mistake this software with cheap "Public Domain" software which others offer. All of this software is copyrighted and professional in quality. The tutor is unique with us and has helped thousands of new users learn their disk drive.

only \$27.95

(or even better)

**only \$6.95 with
any Disk Drive Purchase!!**

512K Upgrade

Again at a popular price. Fully assembled and tested before shipping. Easy to install. Uses fast 120 ns. chips.

Only \$99.

Now includes **memory test, Ram Disk Lighting, Printer Lighting, and Back-up Lighting.** All with an upgraded manual exclusive with OWL!

Our prices include a discount for cash but do not include shipping.

OWL-WARE has a liberal warranty policy. During the warranty period, all defective items will be repaired or replaced at our option at no cost to the buyer except for shipping costs. Call our tech number for return. Return of non-defective or unauthorized returns are subject to a service charge.

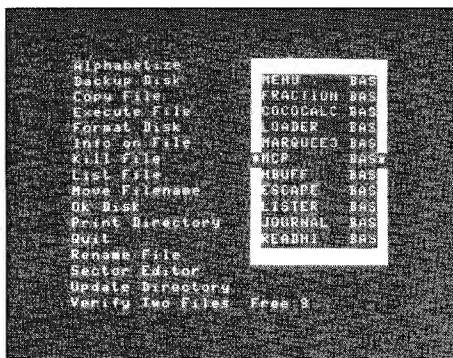
OWL-WARE

P.O. BOX 116

Mertztown, PA 19539

and backups up-to-date. Also, since *Omni 2.0* is so easy to use I found I would put more programs on a disk instead of buying more disks, which saves money.

Regarding the sector editor: To be honest, if I found an error I really wouldn't



know what to do. But I would like to add that even after reading numerous articles on disks and the various languages, I have learned more about both after using *Omni* only for a short time. In conclusion I feel *Omni 2.0* is a very good buy; it's ease of use with the number of options it offers makes *Omni 2.0* a good value for the price. Anyone with a disk drive could put *Omni* to good use.

(GSW Software, 8345 Glenwood, Overland Park, KS 66212; \$20)

—Steve Griffith

Software

OS-9 Level II

S — Screen Control Utility — Commanding the Screen

Anyone who has tried to manipulate the text screen under OS-9 while writing shell scripts has run into the infamous display command. This command uses a series of hexadecimal codes to do things such as clear the screen, make the cursor blink, use reverse video, etc. For the normal computer user these codes are impossible to try to remember. Enter *S* — Screen Control Utility.

S is a small, 509-byte module that allows you to enter two-character mnemonic codes to accomplish 37 screen functions. At the command prompt, or in a shell script, simply type *s* followed by a series of codes:

s br bb 'Enter Selection' eb er rb

This command begins reverse video, begins blinking and prints the message "Enter Selection." The remaining codes end blinking, end reverse and ring the bell. The net effect of this command is that the message is in reverse video, blinking with the bell sounding to get the user's attention. To do the same thing with the display command you type the following:

```
display lf 20 lf 24
echo Enter Selection
display lf 25 lf 21 07
```

Now, you tell me which is easier! As I noted above, *S* supports 37 mnemonics and the ability to print text. Space doesn't permit me to list all the options, but they are listed in the windows section of the OS-9 manual.

Although *S* supports the ability to end the current window or an overlay window, it does not create these windows. This is something that should be included in *S* to make it complete, and I hope the authors will do so.

Perhaps some of you are saying this is nice, but you don't write many shell scripts. If you have installed *Shell+* (a replacement shell available from Delphi and CompuServe), you can do a lot of neat things with *S* and *Shell+*. You can do even more with BASIC09 and *S09*. *S09* is the second part of the *S* package that provides the BASIC09 programmer with the same mnemonic codes that *S* does but with even more capability. For the above example one could define a BASIC09 string as follows:

```
Dim op:string[80]
op:="br bb 'Enter Selection' eb er rb"
```

Then every time you want to place the message "Enter Selection" in reverse video (with blinking and the bell sounding), you type *run S09(op)* in the BASIC09 code. *S09* allows you to define a number of strings at the beginning of a program and call them at appropriate times.

The *S09* program also provides input capability. If we define the variable *ip* as *ip:=string[10]*, then *run S09(op,ip)* will print the message as above and wait for the user to type in a response up to 10 characters long. The input string can be defined for any length of characters allowed by BASIC09. For the example we have been discussing, *ip* would be defined as one character for a menu response.

The *S/S09* software package is very simple to use, yet provides a lot of capability. Either module is easy to install by simply merging the program to a module,

such as shell, that is usually loaded into memory during system booting. Finally, the modules' small size allows them to be permanently included in the boot. I strongly recommend the *S/S09* package to anyone who regularly uses OS-9.

(r3 Systems, 4072 E. 22nd St., Suite 178, Tucson, AZ 85711, 602-745-2327; \$19.95 plus S/H)

—Donald Dollberg

Software

CoCo 3

UpDOS — DOS Is Looking Up

Hey, Vern, I see you have a CoCo 3! Neat machine, isn't it? Yeah, I think so too. Hey, wait, I see you're still using plain old vanilla Disk BASIC! Haven't there been times when you wished there were a few more commands and functions? You know, your CoCo can do a lot more. Like what? Well, take your disk drive over there. Did you know that thing is actually double-sided? 40 tracks? Can step at 6 ms? And did you know that your CoCo 3 has true lower-case? That you can boot up with any screen width and palette selection? That you can actually save all those nifty graphics you create? How do you get all this stuff? Funny you should ask — I just happen to have my *UpDOS* program with me. Check this out . . .

UpDOS is a program that makes numerous patches to Disk Extended Color BASIC to give your CoCo 3 more commands and functions — and thus *power*. It is an addition to the line of alternate CoCo DOSs that deserves your consideration. The first thing about *UpDOS* that caught my attention was the clear, complete and informative documentation that came with it. The 27-page manual is well-written and organized, and it completely explained all the features the program makes available. In addition, there is a special technical section in the back for those wanting more detailed explanations of some of its functions. The *UpDOS* package works without any errors or problems and is very user-friendly.

UpDOS adds several new commands to Disk BASIC. First and foremost are the *HSAVE* and *HLOAD* commands. Using these it is possible to save, and later retrieve, high-resolution screens. The screens can be saved in one of two formats, selected when *UpDOS* is configured to your particular system:

“Poker Showdown, a video game of high tension and realism”

—*The Wall Street Journal*, March 15, 1990, page 1

- Play against people worldwide
- Chat while you play
- Amass a fortune in “Computer Chips”
- Straight poker, 5-card-stud, 5-card-draw, 7-card-stud, and Texas hold'em
- Robot players ensure that all tables had an ideal number of participants

Poker not your game? DELPHI has many other games, thousands of CoCo programs to download, and all of the other services you would expect from the world's premier online information service.



As a *RAINBOW* subscriber, you get a **FREE** lifetime DELPHI membership (\$29.95 value) which includes a credit worth one evening hour of usage (\$7.20). If you don't already subscribe to *RAINBOW*, just request a subscription when you sign-up to DELPHI, and, for the \$31 subscription fee, you'll get the same great deal!

With your CoCo and modem:

- Dial 1-800-365-4636
 - At *Username*: type JOINDELPHI
 - At *Password*: type RAINBOW
- (Or, if you do not yet subscribe to *RAINBOW*, type SENDRAINBOW)

DELPHI™

The World's Premier Online Information Service

800-544-4005 • 617-491-3393

.MGE format is that used by *Color Max 3* and the .CM3 format is used by *CoCo Max III*. You don't need either of these programs to use *UpDOS*, but saves you make will be compatible with them. *UpDOS* allows both types of formats to be compressed to save disk space. Another new command is the *HVIEW* command, which is the same as an *HSCREEN* command but doesn't erase the graphics page.

Some additional commands are *AUTO*, which allows automatic line numbering when entering BASIC programs; *RUNM*, equivalent to a *LOADM* and *EXEC* for machine language programs; *BORDER*, for changing the border color in the Hi-Res graphics and text screens; and *UNDO*, which removes many of the changes that *UpDOS* makes to Disk BASIC, allowing the running of some programs that would otherwise not be compatible with *UpDOS*.

A few commands have been enhanced by *UpDOS* to provide more capabilities. You can enter *DIR,W* to see a directory listing in multiple columns, allowing more files to be viewed at once. There is a "Copy filename to drive" command, as in *COPY "MYPROG.BAS" TO 1*, allowing saves from one disk drive to another without your having to retype the entire filename. *EDIT xxx,yyy* copies BASIC line *xxx* to line *yyy*, useful when the same line is used elsewhere with only a few or even no changes. *PCLEAR* can now be entered with a value up to 16 in order to reserve more space for low-resolution graphics.

UpDOS adds some very useful functions that are enacted with but a few keystrokes. *ALT-F* and *ALT-S* change the CPU speed to fast or slow while maintaining the correct printer baud rate. *ALT-O* toggles true 32-column lowercase. *ALT-P* toggles the dual output to screen and printer. *SHIFT-ALT-BREAK* does a cold start. (It is nice to be able to do a cold start without having to reach behind the computer to probe for the reset switch.) *UpDOS* also allows you to recall and edit the last command line entered. All BASIC functions can be entered in lowercase, and the program can be configured to boot up using lowercase. The only problem I found with this is that while editing it isn't possible to use lowercase to issue commands (such as insert or delete) so it is necessary to shift each letter or do a shift-lock.

UpDOS can be configured to your particular system using the menu-driven configuration program. Several options are available in this program that expand the power of the CoCo 3. You can choose either 35- or 40-track drives, single- or double-sided, at any step rate between 6 and 30 milliseconds. There are several features that are executed on power-up

with *UpDOS*. The screen can be set to come up in either 32, 40 or 80 columns, with any foreground/background color combination. For those using monochrome monitors, the color burst can automatically be disabled. Finally, upon power-up *UpDOS* can automatically issue a DOS command or run a specified BASIC program.

UpDOS can be used as a program that is loaded in from the disk, or it can be burned into an EPROM, which replaces the standard Disk BASIC ROM. When using *UpDOS* from disk, all of the configurable power-up options are executed when you first load the *UpDOS* program from disk, but not upon subsequent cold starts (*UpDOS* must be reloaded from disk).

I think you will find *UpDOS* a useful addition to your CoCo library, and that using this well-designed and user-friendly product will be a joy.

(ESP, P.O. Box 63065, Wichita, KS 67203, 316-722-7442; \$24.95)

—Michael G. Toepke

Software

CoCo 1, 2 & 3

Paladin's Legacy — Have Sword, Will Travel

Paladin's Legacy is a fantasy role playing Adventure designed to work on any CoCo with a minimum of 64K and a disk drive. In trying to be compatible with every CoCo model, the program relies heavily on color artifacting and therefore loses crispness if viewed on an RGB monitor. So graphics are actually clearer with either a composite monitor or a TV set.

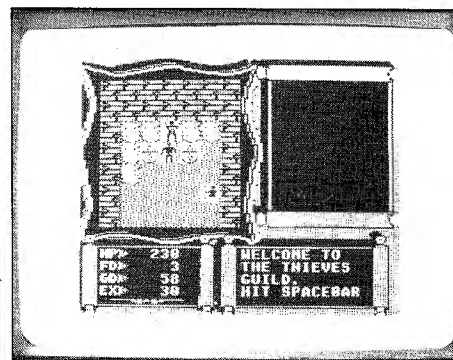
Paladin was a mythical figure who single-handedly brought peace and order to chaotic Tarinth, a land inhabited by elves, dwarves and humans. After 200 years of tranquillity, horrible, unearthly creatures are once again prowling the land, attacking at will and have gone so far as to kidnap the king. Moreover, the king is the protector of Tarinth and its five cities. The citizens of Tarinth now seek a champion to locate and rescue their king and hopefully restore peace in their land. The task is not an easy one.

The game allows you to create your own champion, give him a name and choose his attributes (strength, dexterity, wisdom and intelligence). Once you've done this, your champion is placed onto the terrain to fend for himself. You move around by pressing

the arrow keys, but be careful as unprovoked attacks by a variety of beasts are constant. Once your hero has fought off attackers — accomplished by pressing the space bar — he earns gold and experience points. Gold can also be obtained by finding treasure chests.

In order to survive, you need to find some sort of weapon and armor as soon as possible. It may also be prudent to pick up a snack, lest you die of starvation. Food, weapons, armor and information can be obtained in five cities. Once a city tower or door is found, place your character on top of it and press E to enter the city. At this point the program prompts you to flip the disk over so that the required data can be loaded for your activity in the city.

When the character leaves the city, the disk is again flipped to get back to the playing field. One unique feature of the game is that it allows you to "talk" to any of its citizens. By moving your player in front of the person you want to address and



pressing T (for talk), you can gain some hints, clues or information. It is not enough to be an able-bodied swordsman or a great combatant, as you must also be able to manage your gold properly. It costs 1000 gold pieces, for instance, to buy a boat needed to sail across the waters. Special equipment, such as boots to scale the mountains or heavier and better armor, can all be bought at stores in the cities. Magic — which enables someone to walk through walls — can also be obtained by a clever adventurer. You can even have an audience with the queen, who may or may not give you a promotion to the next level.

To help the weary adventurer, a continuous run-down of the character's current status is displayed on the screen. This lists the amount of food and gold and how many hit points you have. Further information, such as what armor you are wearing and what weapon you are wielding, is found by pressing S (for status). In fact, all commands are simple one-letter commands: A for Attack, B for Board boat, D for Drop, E for Enter, L for Leave boat, etc.

Six pages of instructions, including a background story, accompany the floppy (a

floppy disk that you flip over). These instructions adequately cover everything the adventurer needs to know. Games can be saved and recalled, and when death comes — as it surely does — the game allows you to go to an area and be resurrected instead of rebooting and starting all over.

One side of the floppy is copy-protected so that the user can only back up one side (which is like getting one side of your car insured). Furthermore, the instructions start by stating: "...thank you for purchasing this software instead of pirating it." True, pirates exist, but why insult your customer's integrity? If he is reading the instructions, chances are he bought the item and should not be subjected to such comments!

While the constant flipping gets to be annoying and the graphics resolutions are minimal, operation and movement are smooth. The role-playing connoisseur will probably not mind parting with the money to play *Paladin*. The novice, on the other hand, may soon tire of pressing the space bar or may die of starvation before ever really getting involved.

(Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, 412- 372-5674; \$24.95)

— George Aftamonow

Software

CoCo 3

A World at War— Revised and Improved

In the November 1989 RAINBOW (Page 110) is a review of *A World at War*. In early December 1989, I was assigned to review this game for a second time. RAINBOW seldom reviews the same product twice unless revisions are so extensive that it is virtually a new product. So, what gives?

As I began examining Greg Wittmeyer's new offering, I kept the November review by Greg Snow beside me. It is a favorable review, but it does contain some minor criticisms. I am pleased to see that the new version appears to have been coded with the review right beside the computer. All the original positive features are still there, but each of the previous areas of criticism is now improved. I believe any programmer who responds that rapidly and positively to a review will probably provide excellent customer service and product support.

The original version is written for the CMP palette and does not contain any con-

venient way to modify the version for an RGB Monitor. I've displayed this game using default CMP colors on an RGB Monitor and it's not bad, but compared to what it should be, the loss in artistic merit is worth mentioning. The new version provides a well-implemented Color Slot Code Editing option along with partial documentation. Fortunately this editor displays each color chip along with the color code and slot it is placed in. Unfortunately, Mr. Wittmeyer does not have an RGB monitor to play around on, so he avoids providing a list of the preferred RGB color codes for each slot. Wittmeyer is correct in his observation that people set their color and hue controls so differently that what I like and consider "peach" may or may not be what

you consider peach. I will list the color codes you might use to start with in setting up the RGB palette (see Table 1).

I played two or three games using the default CMP palette on my RGB monitor. The visuals are impressive and the games fun. Then I converted all the files on the two disks to the equivalent RGB codes and tried running them again. I found amazingly beautiful improvements to what was already a good product. If you own an RGB monitor, take the time to modify the color codes in each slot of each file; the results are worth the effort.

When Greg Snow reviewed this package, he found five ready-to-run *War* files plus a blank default file on which to practice editing. I found six plus a blank. My

Graduate up to **stair** micronics

MULTI-FONT PRINTER

NX-1000II

Now a Blazing
180 characters
per second!

The NX-1000II gives you plenty of print options for attractive printing.

Four typesets.
Four pitch sizes.
in standard
and italics
for a total
of 32
NLQ
modes.

The NX
1000 Rainbow
gives you all these features plus
online access to 7 color printing and graphics.
Black, blue, red, yellow, green, violet, and
orange. Both models have a 1 year warranty
and a 30 day online trial.

NX-1000II SPECS: 180 cps Draft, 42 cps NLQ (18 x 23 dot matrix);
4 NLQ Fonts: Italics, Sub & Superscripts, Emphasized, Out-
line, Proportional, Condensed, International, Downloadable
Quasi Tall, Double Tall, Underline, 9+ Pitches, Forward and Reverse;
n 216 Line Feeds, Absolute or Relative Vert. & Horiz. Tabs, Left,
Center or Right Justification, 8 Graphics Modes to 1920 dpi, Macro
Instruction, Bidirection, Adjustable Tractor Feed, 200+ Printable
Characters, Semi Auto Sheet Feed, Front Panel Soft Touch
Control, Epson and IBM Emulate, 4x Data Buffer, Hex Dump.
NX-1000 Rainbow: 144 cps Draft, 36 cps NLQ, rest same as NX-
1000II plus color.

NX-1000II SYSTEM INCLUDES:

- Star NX-1000II Printer **\$199⁹⁵**
 - Blue Streak Ultima
 - Software Support Trio
- COMPLETE** +\$10 Shipping

NX-1000 RAINBOW SYSTEM

- INCLUDES:**
- Star NX-1000
 - Colour Printer
 - Blue Streak Ultima
 - Software Trio
 - Color Super Gemprint
- \$259⁹⁵** +\$10 Shipping
COMPLETE

The Smallest, Sleekest, Fastest Serial To Parallel Converter You Can Buy!

7 Switchable Baud Rates

300 • 600 • 1200 • 2400 •
4800 • 9600 • 19200

Use this "smart" cable to connect a Centronics parallel printer to any version CoCo or use it to improve performance of your current printer. The cables are long-life, high quality shielded cables with moulded plugs for extra durability.

Try a Blue Streak Ultima on your system for 30 days RISK FREE. One year warranty.

The Blue Streak Ultima

Powered version
add \$6.00. **\$39⁹⁵**
+\$2 Shipping



Software Support Trio

Type Selection/Tutorial

Online instructional program that will select 24 special features of your printer or display methods to incorporate them into your programs.

Super Gemprint

Will transfer Pmode 0, 1, 2, 3, or 4 picture screen to printer 8"x11" hardcopy. Black/white, white/black or grey level shading for color.

Hi-Res Super Gemprint

Disk software that will transfer a Hscreen 1, 2, 3, or 4 picture screen to printer. Grey level shading for color.

FREE with purchase of any NX-1000 Printer
All Three Programs \$19⁹⁵

Color Super Gemprint

Print your Graphics Screen in Color on your NX-1000 Rainbow!

Use your favorite program to create a pmode or hi-res graphic image, but don't stop there! Run our color graphics software and print a color image using a palette of 81+ colors on your NX-1000 Rainbow from a CoCo 1, 2, or 3. Requires 32k ECB Disk.

\$19⁹⁵
FREE with purchase of any NX-1000 Rainbow System
Price, availability and specifications subject to change without notice.

Order Your System Today... Call (513) 885-5999

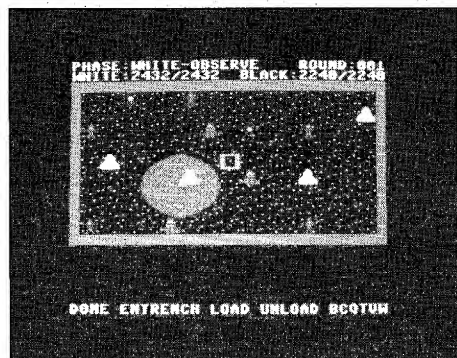
DAYTON ASSOCIATES of W.R. Hall, INC.

9644 Quailwood Trail • Spring Valley, Ohio 45370

Shipping charges to Canada, P.R., HI, AK, APO, FPO are double. Triple charge to all other countries.

Visa & Master accepted within the continental U.S.
Ohio residents add 6.5% sales tax
COD add \$3.00

selection differs from his, and I would like to get copies of both sets for variety. My choices include one involving magic characters in a dungeon; another covering the Pacific Theater Campaigns of 1941 to 45;



two futuristic space wars; a land warfare exercise; and a battle that seems like a college fraternity game — you capture flags and your weapons are actually water balloons!

But the packaged wars are not the major attraction. Like Snow, I am very impressed with the high quality of Wittmeyer's make-a-war-yourself editors. The icons for the fighting units allow multiple variations of such staples as tanks, artillery, ships, submarines and planes. The fleet of spaceships supplied would make a Star Wars graphics designer envious! Plus there are various little men and horses — with or without armor — which provide additional variety and can be made into all types of magical figures (if *Dungcon-and-Dragon* types are your thing). Because of the excellent Icon editor, this collection is only your starting point!

The screens are a little larger and more

detailed than Greg Snow describes in his review, and the maps now *look* like maps. Speaking of maps, the Terrain editor is as well-implemented as the Icon editor. Before you start using the Terrain editor, be sure to tour all 200 terrain features available in each of your seven files (1400 features in all). Many features have been repeated, but definitely not all of them. This is also true of the icons. And in setting up your map, the Fill feature that Snow requested has been provided.

The manual supporting all this is now over 30 pages (as opposed to 22 in the old version) and is reasonably clear and well-written. However, it still must be read more than once because this software has so many options and is so complex. A summary sheet of the commands is provided. The one item (besides the RGB Table) I feel is missing is a figure showing each menu for reference: It would speed learning.

The Append function allows you to combine features from different games. At one point I tried a war that included magic elves, nuclear weapons, aliens with laser cannons and modern tanks and planes. It got a bit messy and I do not recommend such extremes normally, but it can be done.

My negative comments? Well I have two, both minor. First, only Drive 0 is supported for all reads and writes. Because the starting library contains two disks and each disk only holds four files, frequent disk swapping is annoying. I also have reservations about whether RAM disks and hard disks can be used without problems. My second comment is that I had to kill all power to exit a demonstration game I devised of the computer playing itself. I later

found out pressing BREAK exits a demonstration game, though only after a sequence is completed. Since I had constructed a large demo, turning off the CoCo proved to be less time-consuming than waiting for a cycle to end.

I am a reserve officer employed in the defense industry. Both as an operations analysis principal engineer and as a pentagon full colonel, I have played serious war games for a living. Currently, one of the better games contains unit and map editing software based on programming concepts very similar to those used here.

One final comment: When all the possible units (60 per side) and all the options are in use at once, this game slows down quite a bit. Do not be seduced by technology. An adequate and exciting game can be built with fewer players (hence, more speed). After all, football is considered a war game and uses 11 players rather than 60 on a side. Hmmm — I'll bet I could make *A World at War* play soccer (without that obnoxious ticket taker). Let's see, what color should I make . . .

(GSW Software, 8345 Glenwood, Overland Park, KS 66212, 913-341-3411; \$25)

— Larry Elman

Software

CoCo 3

Predator— An Addictive Arcade/ Action Game

The mass marketing of box office hits has led to the sale of dolls, stuffed animals, cereals, toys and, of course, computer games. *Predator*, an action/arcade game based on the movie starring Arnold Schwarzenegger, has been programmed for the Color Computer 3 by Greg Zumwalt. *Predator* is published by Activision and marketed by Tandy. Game requirements include a composite or RGB monitor and good hand/eye coordination. Optionally you can use a joystick to play.

To get started, insert the ROM pack and assume the role of Major Dutch Schaefer, a highly-trained commando whose entire squad has been mercilessly wiped out by a cunning creature. Your mission, if accepted, is to hunt down the Predator.

You start each stage with ten life points that are reduced each time you touch or are shot by soldiers and creatures. You may

Slot #	Desired Color	GSW CMP Code	Equivalent RGB Code
0	Black	00	00
1	Red	07	36
2	Blue	12	09
3	Green	01	18
4	White	63	63
5	Yellow	36	54
6	Orange	22	38
7	Purple	10	12
8	Medium Grey	32	56
9	Dark Grey	16	07
10	Light Green	17	23
11	Dark Green	03	02
12	Light Blue	28	25
13	Pink	24	46
14	Brown	05	04
15	Peach	54	60

Table 1: Suggested Color Codes

receive more life points at harder stages — a token of charity from *Predator*.

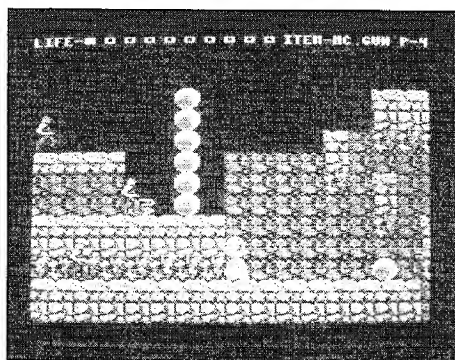
At first glance I was a little skeptical about the scenario: lots of jumps over and onto ledges and avoiding creatures that drain your life away. (I guess leaping from ledge to ledge is fine if you are a Rocky Mountain bighorn. Though if I remember correctly, bighorns don't have soldiers, scorpions or sea urchins shooting, stinging and nudging them into a great abyss every other step of the way.)

The first stage is set in a forest. With a minimal amount of hazards, this stage provides exercises to acquaint me with my new environment and player attributes — a boot camp of sorts. After jumping around and riding a scorpion or two, I found a rifle, which greatly increased my chances of completing Stage one. Each stage follows a pattern of teaching a new skill. Until I became proficient at using each skill, I remained at that level.

To complete a stage it is necessary to locate a cave entrance. On some stages two caves are visible, but only one advances you to the next level. The other may send you back to a previous stage. Soldiers, scorpions, boulders with eyes, seahorses, bats, fish, urchins, plants, laser-emitting forms and other assorted pesky, tenacious

creatures will try to thwart your progress.

The stages I managed to get through — scathed though alive — were the forest, cave and aquatic settings. You must maneuver through 30 stages to defeat the Predator. Stages progressively become more



difficult to exit and require cunning plans of execution. As available weapons vary (rifles, grenades and laser guns), you are able to use different tactics. When you reach Stage 11, you'll find the amount of creatures and obstacles present almost overwhelming.

Each stage's difficulty increases beyond jumping ledges and destroying small stone barriers. Ledges shrink and barriers become massive walls. Clearing the stones is no longer a mere feat of demolition — they

must be cleared to avoid creatures while still leaving access to stairs, pathways and bridges.

Each level presents a colorful array of creatures, moving to and fro. What struck me most was the amount of information stored in this ROM pack. Why don't other game ROM packs offer comparable programming techniques?

Unfortunately there is no save feature in *Predator*. However, there is a Continue option that allows you to continue from the last stage successfully completed. This option works fine until the computer is reset or turned off.

In conclusion, *Predator* provides plenty of playing time and varied screen scenarios. The graphics are good on RGB or composite monitors. The sound effects add the excitement of lasers, explosions and gun fire. After reaching higher levels in this game you won't want to turn your computer off and restart from the beginning. Let me forewarn you, *Predator* is an addicting action/arcade game!

(Activision, distributed by Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; \$34.95)

— Tony Olive

NEW!!

NEW!!

NEW!!

NEW!!

We've Just Converted Over 250 Macintosh Quality Pictures For The Color Computer. Each Set Includes An Excellent Graphics Editor! Pictures are CoCo-MAX II compatible.

Set #1	Set #2	Set #3
Clipart	Celebrities	Adult Only
Space Pictures	Cartoon Characters	R-Rated
Animals	Great Graphics	Beautiful Women
More	More	

**Each Set Of 10 Disks
Only \$35.00 !
Buy 2, Get One Free!**

VISA

MasterCard

Coco 1,2 And 3
32K Minimum
Disk Only

T&D Subscription Software • 2490 Miles Standish Dr., Holland, MI 49423 • 616-399-9648

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

◆ **Bible Scriptures**, a program that presents scriptures and requests of the user the appropriate book, chapter and verse. The program can be customized by changing the information in the DATA statements. The package also includes *A Bible Adventure* (a text Adventure written in BASIC), *A Journey to the Promised Land* (a combination quiz/text Adventure based on the Israelites' 40-year journey) and *Bible Questions Parts I, II and III* (a quiz covering general Bible knowledge, famous biblical personalities and famous Old Testament quotes). For the CoCo 2 and 3, requiring 64K. *Sebastian LaSpada, 531 Main St., Dunkirk, NY 14048, (716) 366-5261; \$10.*

◆ **CHII Clipart**, a collection of 672 pieces of clip art for the *CHII Pages* CoCo 3 desktop publishing program. Categories include cartoons, holidays, block letters, education, transportation, sports and more. The graphics were created in HSCREEN3 using the Magnifier tool from *CHII Pages*. Included is a viewing utility (supplied on each disk) that views graphics outside the *CHII Pages* environment. The collection comes on three double-sided disks and requires a CoCo 3 and *CHII Pages*. *Coless Computer Design, 1917 Madera St., #8, Waukesha, WI 53186, (414) 549-0750; \$29.95 plus \$3 S/H.*

◆ **CHII Fonts**, a set of 59 different text fonts that supplement the fonts found in *Color Max 3*, *Color Max 3 Deluxe*, *CoCo Newsroom*, *Newspaper*, *Newspaper Plus*, *Newspaper Plus Final Edition* and *The Rat*. Requires a CoCo 3. The fonts come on three single-sided disks. *Coless Computer Design, 1917 Madera St., #8, Waukesha, WI 53186, (414) 549-0750; \$19.95 plus \$3 S/H.*

◆ **CoCo Cassette #92**, the February 1990 edition of a monthly software subscription service. Issue #92's programs include the following: *Penta-Same* (a version of Yahtzee), *Rotisserie League* (a baseball owner/manager league), *Nick's Quest* (an adventure about "a guy named Nick who is hunting for the 'Wand of Wonder' to save his kingdom"), *Solitaire* (a game), *Education 4* (four grammar lessons), *IBM — BASIC Difference* (discusses the difference between the CoCo's and IBM's BASIC), *Baseball Card Organizer* (tracks baseball card collections on tape or disk), *Munchy 3* (a machine-language *Pac-Man*-type game), *River Raid 3* (a CoCo 3 game in which the player maneuvers a "Raidboat" up a river), and *Cuber* (a machine-language *Q*bert*-type game). *T&D Software, 2490 Miles Standish Drive, Holland, MI 49424, (616) 399-9648; \$8, \$70 for a yearly subscription.*

◆ **Division**, an educational program that teaches the basics of long division. Users have the choice of solving a problem the computer randomly generates, or entering a problem of their own to solve. Written in BASIC for the CoCo 2. *Xyorn, Inc., 43611 Serenity Court, Lancaster, CA 93535, (805) 946-1349; \$19.95.*

◆ **fileMASTER 2.2.1**, a complete database management system for the CoCo 3 and two disk drives. This easy-to-use program makes file storage enjoyable. Import your *VIP* database files. Redefine old databases to accept new fields, change the cursor path, arrange label and page output. Loaded with advanced features. *21st Century Software, P.O. Box 430207, Kissimmee, FL 34743, (407) 348-0848; \$69.95*

◆ **Joy**, a software tutorial that shows users how to construct a working converter box that lets Atari-type joysticks work with CoCo programs. The procedure is illustrated step by step with CoCo PMODE 4 screens. "A complete list of parts and tools needed is supplied in the program with Radio Shack part numbers. Some electronic knowledge will be helpful, but nothing more than a hobbyist's level. A basic knowledge of soldering is a must!" *B&B Software, 1637 Hanchett N.W., Grand Rapids, MI 49504, (616) 453-1011; \$6.50.*

◆ **Mystery**, a graphics Adventure game based on the board game *Clue*, written in BASIC. After a murder has been committed, you must explore the house to locate the body, determine which weapon was used and then expose the person responsible. The goal is to solve the game in the least possible moves. *Xyorn, Inc., 43611 Serenity Court, Lancaster, CA 93535, (805) 946-1349; \$19.95.*

◆ **Overlord**, a military simulation for up to three players (carbon-based or silicon). The goal is to conquer territory by forcible means on a hostile world. You use the industrial capabilities of the cities you conquer to produce more combat equipment, aircraft and ships. Strategy and preparation are the keys to success. Written in machine language for the 128K CoCo 3, *Overlord* requires a disk drive, mouse or a joystick. *Oblique Triad, 32 Church St., Georgetown, ON L7G 2A7, Canada, (416) 877-8149; \$29 U.S., \$34 Cdn.*

◆ **Pistol Grip Deluxe Joystick**, a smooth-tracking analog four-button joystick (two firebuttons on the base, with one thumb button on top of the stick and one trigger button for the index finger). It has molded,

aircraft-style finger grips, a suction base, switchable dual-control buttons, x- and y- axis trim controls and a 6-foot cable. It connects to a six-pin DIN analog game port, fitting both Color Computers and the Tandy 1000 family. *Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; \$29.95; Available in Radio Shack stores nationwide. Cat. No. 26-3123.*

◆ **Rampage**, a CoCo 3 ROM pack game that advises you to "go ahead — get it out of your system. Lose your temper. Smash a skyscraper. Trash a city. Have an office building for lunch." In this game up to three players can work out their frustrations smashing and trashing a city as George the Big Ape, Lizzie the Lizard or Ralph the Wolf. Players can pick off helicopters and climb walls, punching holes and grabbing people and things as they climb. The monsters need to eat to keep up their energy levels: If your energy gets too low, you can turn into a human, and then your friends can eat you. *Activision, dist. by Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; \$34.95; Available in Radio Shack stores nationwide. Cat. No. 26-3174.*

◆ **T&D Software's Grafix Disk Package Set #3**, a collection of 10 disks full of graphics files of "adult-only R-Rated beautiful women." *T&D Subscription Software, 2490 Miles Standish, Holland, MI 49424, (616) 399-9648; \$35.*

◆ **Those Darn Marbles**, a *Marble Madness*-type arcade game in which the player manipulates a marble down a 3-D maze, avoiding "Marble Munchers, Acid Pools and Jehosaphats." Gravity is a factor in the game, and it becomes readily apparent when you attempt to swing around a curve. Digitized sound effects are featured, and the program takes advantage of hardware smooth scrolling of the CoCo 3. The program moves seamlessly down its myriad screens. Players can fall off the edge, get "eaten" and fall into bottomless pits. The object is to reach the exit to each successive level before the clock runs out. Requires a 512K CoCo 3, a disk drive and a joystick. *Oblique Triad, 32 Church St., Georgetown, ON L7G 2A7, Canada, (416) 877-8149; \$32 U.S., \$38 Cdn.*

◆ First product received from this company

The Seal of Certification is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a Seal, the magazine certifies the program does exist — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

FREE SOFTWARE

Order any item by July 31st, 1990 and you may have your choice of either the **Silly Syntax** story creation game (including two stories) or the **Flying Tigers** arcade game for **Free!** - You don't even pay shipping!

CALLIGRAPHER

CoCo Calligrapher - Turn your CoCo and dot-matrix printer into a calligrapher's quill. Make beautiful invitations, flyers, certificates, labels and more. Includes three 1/2 inch high fonts. Works with many printers such as Epson, Gemini and Radio Shack. Over 135 additional fonts are available (see below). Tape/Disk (RS-DOS); **\$24.95.**

Calligrapher V2 - Prints all the same fonts as the CoCo Calligrapher. It reads a standard text file which contains text and formatting codes. You specify the fonts, centering, left, right or full justify, line fill, margin, line width, page size, page break, page numbers, indentation, multiple columns, macros, headers, footers and more. Includes the same 3 fonts with additional fonts available below. Disk only; Specify OS9 or MS-DOS; **\$24.95.**

Calligrapher Fonts - Requires Calligrapher above. Each set on tape or disk with 8 to 10 fonts; Specify RS-DOS, OS9 or MS-DOS format; **\$14.95** each:

- Set #1 Reduced and reversed originals;
- Set #2 Old Style and Broadway;
- Set #3 Antique and Business;
- Set #4 Wild West and Checkers;
- Set #5 Stars, Hebrew and Victorian;
- Set #6 Block and Computer;
- Set #7 Small: Roman, Italics, Cubes, etc;
- Set #8 Novelty fonts;
- Set #9 Gallant and Spartan;
- Set #10 Several Roman fonts;
- Set #11 Gothic and Script;
- Set #12 More Roman and Italic;
- Set #13 Several Courier fonts;
- Set #14 Modern and Screen;
- Set #15 Tektron and Prestige.

Economy Font Packages available on disk only, with 25 to 30 fonts; Specify RS-DOS, OS9 or MS-DOS format; **\$29.95** for any one or save by buying two or more at **\$19.95** each:

- Pkg #1 - Above font sets 1, 2 and 3;
- Pkg #2 - Above font sets 4, 5 and 6;
- Pkg #3 - Above font sets 7, 8 and 9;
- Pkg #4 - Above font sets 10, 11 and 12;
- Pkg #5 - Above font sets 13, 14 and 15.

Calligrapher Combo Package - Includes the Calligrapher and any two Economy Font Packages (your choice) for only **\$59.95.** Specify RS-DOS, OS9 or MS-DOS format.

Sample Calligrapher CliPix Pictures



The Font Massager - This OS9/MS-DOS utility program allows you to do many things to Calligrapher font files. You may create new fonts, modify existing fonts, invert fonts, compress fonts, double the height and/or width, halve the height and/or width and convert between RS-DOS and OS9/MS-DOS formats. (Note: OS9 and MS-DOS font files are identical and need no conversion. Simply copy or upload the files from one OS to the other). OS9 or MS-DOS; **\$19.95.**

Calligrapher CliPix - The Calligrapher may now include graphics pictures along with the text it prints. There are currently 9 different CliPix disks available, each one has over 60 different graphic pictures. While the OS9/MS-DOS Calligrapher may easily combine both text and CliPix, the RS-DOS (CoCo) Calligrapher may also print out the CliPix. **\$9.95** each.

- CliPix #1 - Animals
- CliPix #2 - Astrology/Mythology
- CliPix #3 - Jobs (Occupations)
- CliPix #4 - KidStuff
- CliPix #5 - Miscellaneous
- CliPix #6 - Occasions
- CliPix #7 - Sports
- CliPix #8 - Vehicles
- CliPix #9 - X-Rated

SPECIAL INTEREST

Rental Property Income and Expense Management Package - Maintain rental property income and expense records and print reports. 28 expense categories. *This program may be tax deductible.* Disk only; **\$29.95.**

DATA BASE

TIMS Combo Package - All three of the following programs: TIMS, TIMS Mail and TIMS Utility on one disk - **\$34.95.** Save about \$20.00!

TIMS (The Information Management System) - Tape or disk, fast and simple general data base program. Create files of records that can be quickly sorted, searched, deleted and updated. Powerful printer formatting. Up to 8 user fields, sort on up to 3 fields. Tape/Disk; **\$19.95.**

TIMS Mail - Tape or Disk based mailing list program. Files are compatible with TIMS. Fast and simple to use. Supports labels 1, 2 or 3 across, 2 1/2 to 4 inches wide. Tape/Disk; **\$19.95.**

TIMS Utility - Utility companion for TIMS and TIMS Mail for multi-term search (AND and OR logic), global change and delete, split large files and more! Tape/Disk; **\$14.95.**

EDUCATIONAL

The Educational Combo - The Combo includes these educational (and entertaining) games:

- Silly Syntax - (ages 5 and up)
- Galactic Hangman - (ages 7 and up)
- The Presidents - (ages 10 and up)
- The Great USA - (ages 9 and up)
- Trig Attack - (ages 9 and up)

All five programs on one disk for only **\$29.95!**

For a complete catalog of Sugar Software products and fonts, send a stamp and a label.



SUGAR SOFTWARE

P.O. Box 7446

Hollywood, Florida 33081

(305) 981-1241

All programs run on the CoCo 1, 2 and 3, 32K Extended Basic, unless otherwise noted. Add \$1.50 per tape or disk for shipping and handling. Florida residents add 6% sales tax. COD orders add \$5. Dealer inquiries invited. Orders generally shipped in 24-48 hours. No refunds or exchanges without prior authorization.

*TRS-80 is a trademark of Tandy Corp.

Clearing the Paths

by Tony DiStefano
Contributing Editor

Last month we covered the tools you need to design and test a digital circuit. Now I'm going to show you how to use those tools to get the circuit working. Remember, take your time and be patient during this project. Look at any problems from all angles and don't leave out the obvious.

As an example of trouble-shooting, I just received a new 2400-baud external modem at work. It is my job to see that equipment works well before it's used, so I connected this modem to a computer and tried it out. All worked well, except it didn't hang up the phone when I gave it the proper command. I tapped it lightly and it worked. I thought something was loose, so I opened it up to take a look. There was nothing loose. I thought perhaps it was a short. Wrong. After a while I noticed that if I disconnected the telephone line and reconnected it, everything worked alright. So I thought it must be the relay. I checked the signal going to the relay and it was okay. It occurred to me that the contacts of the relay may have been sticking and the tap released it. This idea did not make complete sense. If the line was not connected, an ohm meter test said that the relay contacts did not stick. Yet when the line was connected, it would not let go. This was quite a puzzle.

After checking and checking again, I came up with nothing. Then I sat back and looked at all the facts. It would only stick when the line was on. What was in the line that would make a relay stick? Perhaps it was a magnetic field. The telephone line is

a DC signal. A normal modem uses a transformer to couple the line to the rest of the circuits. A DC current through a coil makes a magnetic field. I checked the transformer. It was right next to the reed relay. Did I say *reed* relay? A reed relay relies on a magnetic field to hold its contacts closed. It seemed impossible, I know. I looked at the relay and noticed that in the assembly stage, the relay was bent and leaned right against the transformer. Could it be that the magnetic field generated by the transformer was holding the reed relay closed? The theory was perfect. I leaned over and bent the relay away from the transformer. The relay no longer stayed stuck when I told it to hang up. Well, this just goes to show you that nothing is too far-fetched.

Not all repairs are fun. Take a look at the do-nothing circuit in Figure 1. It has three chips, two 74LS139s and a 74LS32. The circuit does nothing more than some funny memory mapping. I am using this circuit as a means of showing you how to tackle trouble-shooting and how to check if the circuit works well. You may want to build this circuit, but remember, it doesn't do much. The power connections are not marked on this diagram (the CAD program I use does not show them), but here is the list: U1 and U2, +5V is Pin 16; ground is Pin 8; U3, +5V is Pin 14; and ground is found on Pin 7.

First give the circuit and board a careful visual check. Are the components in their sockets properly? Pushed down all the way? No pins sticking out? Now look at the solder side. Any solder shorts? Cold solder joints? Look at the edge connector. Is it clean? Any broken traces? Before plugging the circuit in, check to see that all the connections are made. Check them again, one wire at a time. When you think it's

okay, check with a continuity meter for shorts between +5V and ground. There should be resistance, but not a dead short.

Now we are ready to plug it in. With all power off, plug in the circuit. Turn the power on and look for your regular screen. If it is not what you usually get, turn it off right away. If it powers up properly, proceed to the next step. If it does not, you have to determine what is causing the malfunction. It can be in the power or a line that connects to the computer's address or data lines. Check all lines to the computer for shorts or outputs directly to the address lines.

When building or trouble-shooting a circuit, it is best to understand how the circuit works. Look at Figure 1 again. To make sure this works, proceed at a logical level. In this case a volt meter and a digital probe are all the trouble-shooting tools you need. You'll need the standard tools, of course, to make repairs. Start with a volt-meter. Use the scale that gives you the most accurate reading at about 5 volts. Put the negative side to a known good ground and check to make sure there is 5 volts on every chip. This often solves the problem. Also check to make sure there is 0 volts on every grounded pin of every chip. An ungrounded chip can also be the problem.

When you are sure there is voltage and ground in every chip, use the logic probe. Set it to the TTL mode. It must be powered from the same circuit you are testing. To check the probe, check a known good ground and a known good +5 volts. The probe indicates the High and Low states properly, either with LEDs, sound or both. The signals from the computer are always changing, particularly the address and data lines. Check to see if these signals appear at the chips—that is, pins 2, 3, 13 and 14 of U1 and U2.

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

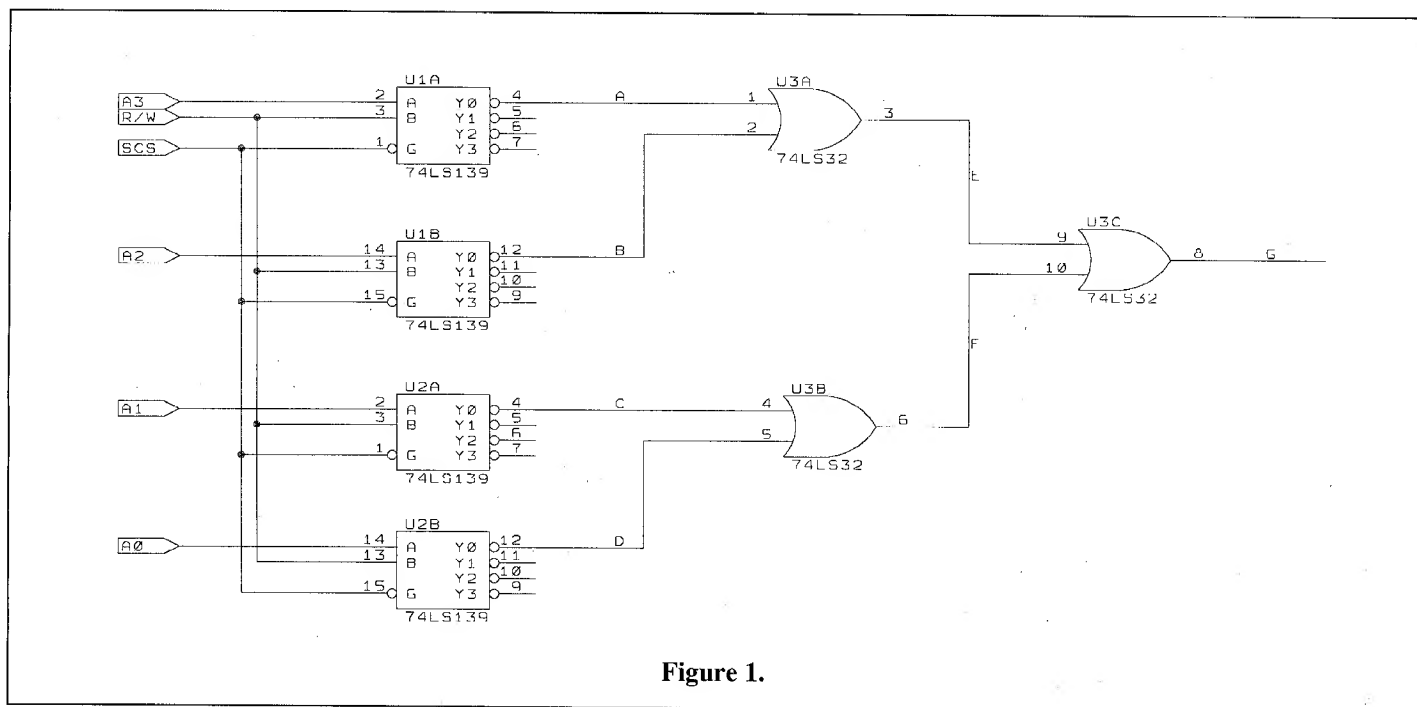


Figure 1.

If there is not a signal at all of these pins, something is wrong with one of the pins. The probe should indicate an oscillating signal.

With all the above signals okay, test the circuit in action. From the diagram, address lines A0 through A3 work with the *SCS pin of the CoCo. We know the *SCS signal is active from \$FF40 to \$FF5F. Also, if you look at the diagram, the *SCS signal goes to every G pin of the 74LS139s. Let's start with U1A. The two inputs consist of the A3 address line on Pin A and the R/*W signal on Pin B. The only connected output is Y0.

Therefore, using the logic diagram for a 74139 when G is Low, A and B have to be Low before there is a Low signal at Y0. This means a Write signal with A3 Low. The next gate is U1B, which is similar but with A2 instead of A3. Now we require that A2 also be Low. The third circuit is U2A. This is done the same way as with the A3 address line but this time with the A1 address line. The fourth and last is U2B, which is done the same way but with A0 as the A input.


You need a signal that activates only one of the four 74LS139s at a time. If you look

at the binary number for A0 to A3, the number you need to activate U1A is \$FF47 (0111 binary in the least significant byte within the *SCS range. A one-line BASIC program takes care of this:

```
10 POKE &HFF47,0 : GOTO 10
```

Type in the program and run it. With your probe, first test to see if the SCS pin is working. Put the probe tip on any pin with the SCS signal. Use Pin 1 of U1A; it is this circuit you are testing. The probe shows a small pulse from High to Low. You can tell

Planet Engine



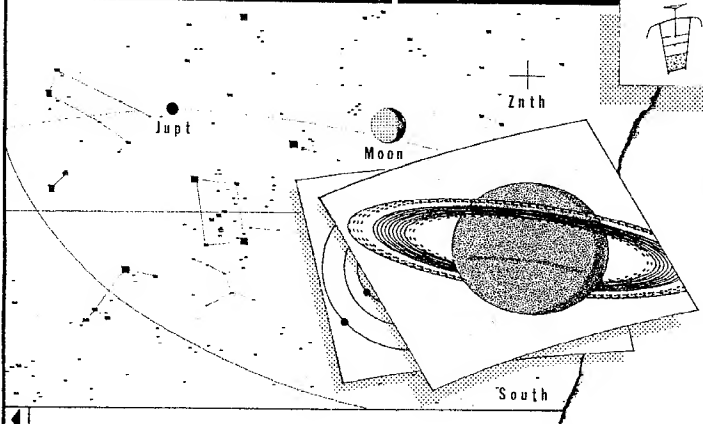
GRAVITY STUDIO

Send check or money order only to...

Belton, TX 76513-7991

Add \$2 S/H, Add \$5 S/H if outside US, Add 7.5% tax if in Texas

\$15 Intro Price!



Planet Engine is a program that takes your time and location to chart a colored sky of planets, stars, and the Moon and Sun. Upon startup, the planets are mapped from current computer time and boldly drawn on the field of equatorial stars beyond. From here you can request orbits, precise date, planet drawings, or skip around to any past or future time or location. The Moon and all planets are shadowed to their proper phase! Earth is shadowed for its appearance from the Moon.

Those with Multi-Vue can execute Planet Engine from mouse clicks and icons; the pull-down menus, scroll buttons, and overlay windows make your experience stimulating and delightful. Your Earth location and display group list is conveniently stored in the RIF file and passed to Planet Engine every time you double-click on the 'Planet' icon. Also with Multi-Vue, you can scroll the sky east or west to check the approximate rise or set times of any displayed object with the horizon line.

Teachers and star-gazers will love the display groups that can be switched on or off: Planets, Stars, Moon/Sun, and Annotation (labels). This feature lets you watch just the Sun and Moon in the sky or turn everything off except the stars through their personal experiences. Teachers, make your students leave off the labels to identify planets by experience only. Travelers and eclipse-chasers can reset the Planet Engine to another part of the world and pre-observe what astronomical opportunities await them. Your personal planetarium is ready!

* THE PLANET ENGINE IS \$24, BUT ONLY \$15 IF ORDER POSTMARKED BEFORE JUNE 1, 1992!

* Requirements: Gnu 3 + (OS-9 Level) 2 + 128K Minimum

* Both Multi-Vue and non-Multi-Vue versions are included at one price!

* Also included for Multi-Vue users: RIF files, and 'Planet' icon.

* Multi-Vue is required for the high-level mouse and menu version.

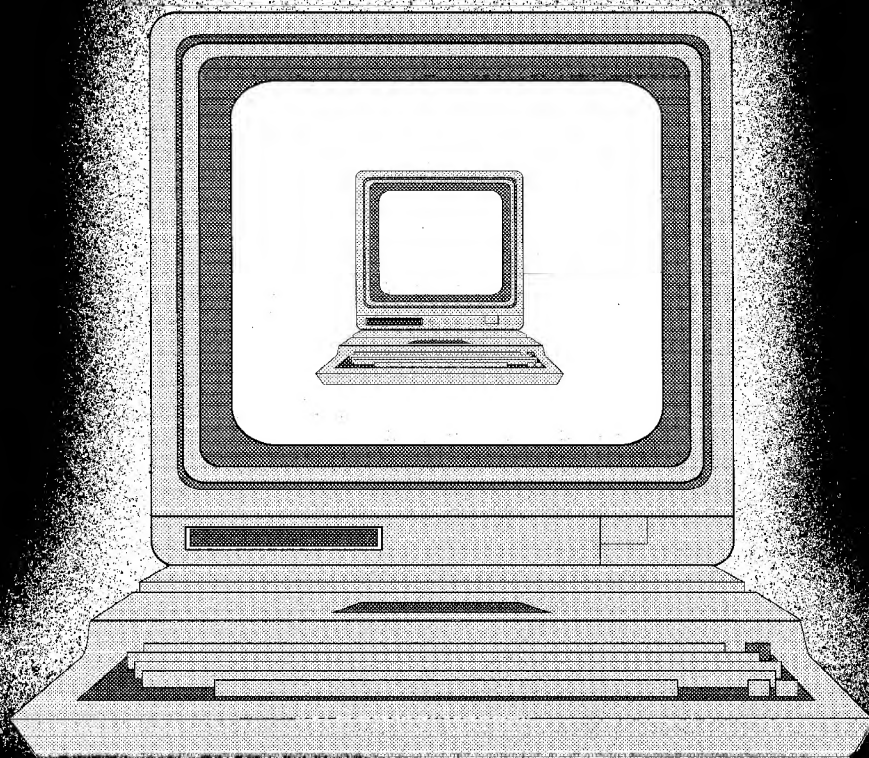
In the Beginning . . .

Your CoCo is the longest-lived, most innovative and, surely, best-loved Computer ever to hit the market. In constant use by millions of us for a decade now, its story is both an interesting and fascinating one. And now you can relive it all — all the fun, the people, the frustrations — in *CoCo: An Affectionate History of the Tandy Color Computer*.

This anecdotal history of the CoCo, by well-known authors Dale and Esther Puckett, tells the stories of those people at Tandy who brought us the Color Computer; the programmers who've put the 6809 through its paces; the hardware gurus with their electronic marvels; and the many vendors who have made these innovations available to us. You'll also read about people like you who have supported

the Color Computer with countless hours at the keyboard and by attending CoCo functions. You never know — you might even read about yourself. And this says nothing of the many pictures you'll see.

CoCo: An Affectionate History is scheduled for release early in the fall of 1990. Prior to publication it will be available in an attractive limited-edition hardcover version for only \$45. A softcover version will also be available for \$15.95. But if you order now, you can reserve copies of the softcover version for a pre-publication price of just \$13.50 apiece. Reserve a copy of *CoCo: An Affectionate History* for yourself. Or order several for those you care about — and take a walk down Memory Lane together.



Yes! I want to reserve: _____ hardcover copies of *CoCo: An Affectionate History* for \$45.00 apiece.
_____ softcover copies of *CoCo: An Affectionate History* for \$13.50 (plus \$2.50 S/H) apiece.

Name _____

My check in the amount of _____ is enclosed.

Address _____

Or, bill to: ☐ VISA ☐ MasterCard ☐ American Express

City _____ State _____ Zip _____

Account Number _____

Signature _____

Expiration Date _____

Mail to: CoCo History, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. For credit card orders call (800) 847-0309, 8 a.m. to 5 p.m. EST.

this by the flashing LED or a warble in the sound. Remember, BASIC is slow and the pulse is real short. You may be able to tell only by looking at the LED. To be sure the input works, check the output. Put the probe on Pin 4 of U1A. You should get the same pulse. If you don't, check pins 1, 2 and 3 again. Now make sure the other three gates are not activated. Check the other three Y0s for no signal. Next, do the same for the other three gates. The new addresses are: &HFF4B for U1B, &HFF4D for U2A, and &HFF4E for U2B. When you test for one working gate, make sure the other three are not active.

You can safely say that the first two chips are working. Now you must test the next set of chips. Let's start with U3A. Think back to the truth table for an OR gate and remember you are using it as a Negative AND. Pin 1 and Pin 2 need to be Low in order to get a Low at Pin 3. You must change your software a bit in order to get both parts of U1 in the diagram to go Low at the same time. What is the value? Well, both A2 and A3 must be Low and A1 and A0 must be High. The value then becomes \$3. Change the address to &HFF43 in your one-line program. Run the program and get the probe out. Y0 of U1A and Y0 of U1B should both go Low. The probe verifies this. Next, put the probe on Pin 3 of U3A; it too should go Low. If it is not, check to see that the pulses are appearing at the inputs of the 74LS32. Do the same with the other two 74LS139 parts and U3B. To do this, calculate the right address, edit the one-line program and run it again. This time, test the outputs of U2A and U2B. Check that they both go Low and that they reach the proper pins of U3B.

At this point you can see that you progress from the computer to the end result one step at a time, from the input of one gate to the output and then to the input of the next gate. You must know what each gate does and apply the theory to each gate. Then you

must determine if that particular part of the circuit is working properly. If you don't get a proper signal at the output of a certain gate, check the inputs. If they seem to be right, you know there is power to the chip, because you have already checked it and you know the inputs work. You can then change the chip if you think that part is bad. Don't assume the part is bad just because it doesn't give you the right output.

Now take the next step. U3C is used as a Negative-Logic AND gate. When input A and input B are Low, output Y is Low. In order to make the output of U3C go Low, U3A and U3B must go Low. For this to happen, all four 74LS139 gates must be active. This means you must change the one-line program. Look at the conditions for this. A0 to A3 must all be active, which means four 0s. The new address becomes &HFF40. Edit the line and run the program. From the previous tests you know the outputs from U3A and U3B work. It is now just a matter of checking the final gate. Using the probe, check the output of U3C. It should work. If it does not, it can only be one of the two inputs. Make sure the signals from U3A to U3B arrive at their proper destinations.

Up to now, all I have been using is a probe, but in a simple circuit like this, a probe may be the only tool you need. For every point along these tests, you could have used a scope instead. Procedures for using a scope are much the same. One difference is that most scopes have two channels. While this makes things a little faster by observing two signals at the same time, the real use for two channels is to compare one channel to the other. There is one drawback to using a scope. It is very fast and to be able to occasionally see one pulse (BASIC is slow), the pulse on the screen is very small. Also the sweep rate is so slow that the screen flashes, which makes it uncomfortable to work with. To get around that, I usually punch in a little machine

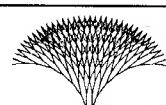
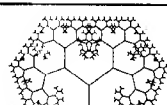
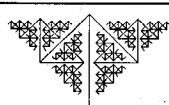
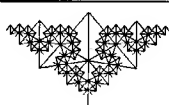
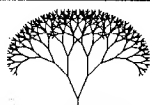
language loop to store or load a byte into memory. I do this so often that I know the bytes by heart. Here is what I do:

```
POKE 4000,&H1A 'MASK INTERRUPTS
POKE 4001,&H50
POKE 4002,&HB7 'STORE COMMAND
POKE 4003,&HFF 'ADDRESS UPPER
POKE 4004,&H40 'ADDRESS LOWER
POKE 4005,&HB7 'BRANCH
POKE 4006,&HBF 'BACK TO THE STO
RE COMMAND
EXEC 4000
```

This program is just a short loop to write a value (usually 0 when using the EXEC command) into a memory location. I change the Write to a Read by doing one different POKE. The REM statements just let you know what is happening; I don't type them in.

Those of you who are lucky (or rich) enough to own a scope can try this dual channel test to examine the timing delays of TTL gates. With this circuit working (trouble-shoot, if not working), put one channel of the scope to Pin 1 of U1A. Run the little program above. Adjust the sync of the scope to gate a stable trace of the *SCS signal. Now with the other channel of the scope, look at the output signal of U3C. In theory, these two signals should be the same, but look carefully to see a slight delay between the first channel and the second. This delay is called the *propagation delay*. It is the time delay between the input and the output of a gate. The more gates used, the longer the propagation delay gets. When you are designing complex circuits like the Super Controller II or my new 1-Meg upgrade, these delays are very critical and must be taken into account.

The next topic of discussion is the logic analyzer. This design is the cream of the crop, but I am not going to go into this. If you need to have one, you know how to use it. This wraps up this month's article on trouble-shooting circuits. □



THE BEST COCO ASSEMBLY LANGUAGE PROGRAMMING BOOKS IN PRINT

"Assembly Language Programming for the CoCo" (The Book) and the CoCo 3 (The Addendum). Professionally produced (not just skimpy technical specifications). THE CoCo reference books.

THE BOOK - 289 pages of teaching assembly language for the CoCo 1 & 2. It's used as a school text and is an intro to Computer Science. It describes the 6809E instructions, subroutines, interrupts, stacks, programming philosophy, and many examples. Also covered are PIAs, VDG, SAM, kybd, jystk, sound, serial port, and using cassette and disk. \$18.00 + \$1.50 s/h.

THE ADDENDUM - Picks up where the BOOK left off. Describes ALL the CoCo 3 enhancements & how to use them with assembly language. The most complete GIME spec. WOW - Super-Res Graphics, Virtual Memory, New Interrupts, and more information not available elsewhere. Find out what the CoCo 3 can really do. \$12.00 + \$1.00 s/h.

COCO 3 SPECIAL
Start your CoCo library right. See what the CoCo can really do and save money - buy the BOOK and ADDENDUM for only \$27.00 + \$2.00 s/h.

US check or money order. RI orders add 6% sales tax

TEPCO
68 James Court
Portsmouth, RI 02871

See Us On DELPHI

The Assembly Line

Part II: Get the Picture

by William P. Nee

Learning to manipulate graphics images can be fun and interesting. We'll look at a program that takes any PMODE 3 or PMODE 4 picture and modifies it 11 different ways. You can save your picture anytime, then continue modifying the existing picture or start again with a new picture.

The machine language program (Listing 1) uses the ORG command several times (lines 110, 340, 800, etc.). This wastes memory, but I wanted to make it easier to distinguish between the different routines.

The BASIC program first asks you to put the disk containing your picture into any drive, then for the PMODE (3 or 4), the filename and the drive number. After the picture appears, press any key to get the following menu options:

- Reduce the picture to half its height and display the image on the top of the screen.
- Reduce the picture to half its height and mirror the image at the top and bottom of the screen.
- Reduce the picture to half its height and copy the image to the top and bottom halves of the screen.

Bill Nee bucked the Snowbird trend by retiring to Wisconsin from a banking career in Florida. The success of this 13-part series "Machine Language Made BASIC" prompted him to continue writing articles on machine language programming. You can contact Bill at Route 2, Box 216C, Mason, WI 54856-9302.

- Reduce the picture to half its width and display it on the left half of the screen.
- Reduce the picture to half its width and mirror it on the left and right of the screen.
- Reduce the picture to half its width and copy the image on the left and right halves of the screen.
- Flip the entire picture from top to bottom.
- Flip the entire picture from left to right.
- Reduce the picture to one-fourth its size and mirror the image at the four corners.
- Reduce the picture to one-fourth its size and copy the image at the four corners.
- Undo all modifications and display the original picture (but in the current PMODE).
- Toggle the PMODE from 3 to 4 or from 4 to 3 and redisplay the current modified image.

Now let's see how the various machine-language routines accomplish each of these modifications. Several of these routines are called more than once, especially when using the four-corner options, since there are differences in setting colors in PMODE 3 and 4. There are also different routines for the same menu options, depending on the PMODE. All the routines use the initial graphics on pages 1 through 4, convert them to pages 5 through 8, then transfer the new picture back to pages 1 through 4. Doing this on a byte-for-byte basis really speeds things along. Routines R1 to R10 (\$6100 to \$6C00) are primarily for PMODE 4 graphics, but I'll point out those that also apply to PMODE 3.

The first routine, R1 (lines 110 through 320), reduces a PMODE 4 picture to one-half its height. Register X contains the start of Page 1 graphics (\$E00), and Register U

contains the start of Page 5 graphics (\$2600). Lines 180 through 220 get the first byte of the graphics data and OR it with the byte directly below it. This is necessary in PMODE 4 graphics because of the fine resolution capabilities. Without checking two lines at once for set points, the modified image could end up with a lot of blank spaces where there should be some detail. The result is the first graphics byte on Page 5. The PCOPY routine (Line 320) transfers the graphics back to pages 1 through 4.

Routine 2, R2 (lines 340 through 780), reduces the picture to one-half its width. Just as R1 reduces a picture by comparing a byte to the one just beneath it, this routine compares a bit to the one next to it (for our purposes, two consecutive bits are one nibble). The width of a graphics image is reduced on a nibble-by-nibble basis.

Register A gets the first graphics byte and uses the BIT command to test it (Line 430). The BIT command is the same as the AND command but only changes the Condition Code Register and does not affect the register being tested. The #192 in Line 430 represents the result of only the left two bits (first nibble) being set ($128+64=192$). Register B contains the final result, so if either Bit 7 or Bit 6 in Register A is a 1, the left-most bit in Register B is set (Line 450). The next two bits in Register A are checked ($32+16=48$) and if either is a 1, the next bit in Register B is set (Line 480). This procedure continues through all of Register A. When the first byte is checked, Register B is only half filled, so we need to get the next byte (Line 550) and test its four nibbles. When this is complete, Register B contains

the result of checking two bytes and can be transferred to pages 5 through 8 (Line 680). The result is transferred back to pages 1 through 4.

Routine R3 (Lines 810 through 980) flips a picture along the horizontal axis. Register X contains the first graphics location on Page 1 and Register U contains the bottom-left location on Page 8. Graphics are transferred on a byte-for-byte basis. When Register U reaches the end of a line, it has been automatically increased by 1 (STA ,U+), so it is necessary to go back up 64 spaces (LEAU -64,U) to drop back one line. Since there is no check for bits, this routine can be used in PMODE 3 or 4.

R4 (lines 1000 through 1450) flips a picture along the vertical axis. Register X contains the top-left graphics corner on Page 1 and Register U contains the top-right graphics corner on Page 5. Since not only each byte but also each bit is flipped, we need to test each bit to see if it is a 1 and, if so, set the corresponding bit. Starting with the left-most bit, each one is tested; if it is a 1, the right-most bit in Register B is set to 1. The reversed byte is then stored in the upper-right corner of Page 5. This procedure continues through all four pages.

The next routine, R5 (lines 1470 through 1960), is used in conjunction with R2 (half

Since not only each byte but also each bit is flipped, we need to test each bit to see if it is a 1 and, if so, set the corresponding bit.

width) to produce a mirror image along the vertical axis. This routine is almost the same as the previous one, but Register Y contains the upper-left corner of Page 5. The reversed byte is stored in the upper-right corner of Page 5, and the original byte is stored in the upper-left corner. Because R2 reduced the original picture to half its

width, R5 now creates a half-size mirror image.

The sixth routine, R6 (lines 1980 through 2180), is used with R1 and R11 (half-height) to create a mirror image at the top and bottom of the screen. Register Y contains the top-left graphics address of Page 5, and Register U contains the bottom-left graphics address of Page 8. The half-size image is reproduced on pages 5 and 6 and the flipped image on pages 7 and 8. Since this is done on a byte-for-byte basis, the routine works in both PMODE 3 and 4.

The SAVE routine (lines 2200 through 2310) at \$6700 saves the original picture in high RAM starting at \$8000. Note that the interrupts are enabled in Line 2230 and restored in Line 2300. The BASIC program automatically calls this routine once you've loaded the picture. The SHOW routine (lines 2330 through 2440) at \$6800 is the reverse of the SAVE routine and redisplay the original picture (in the current PMODE) when you select Option 11. Again note the interrupts in Line 2360 and Line 2430.

R7 (lines 2460 through 2680) at \$6900 copies an image in the upper-left corner to all four corners on pages 5 through 8. This modification is normally used with other routines that reduce a picture to half its width and half its height. Since the graphics

METRIC INDUSTRIES, INC.

Model 101 Serial to Parallel Printer Interface

- ★ Works with any COCO
- ★ Compatible with "Centronics" Parallel Input Printers
- ★ Just turn the knob to select any one of 6 baud rates 300-9600
- ★ Comes complete with cables to connect to your printer and computer
- ★ Can be powered by most printers

Model 104 Deluxe Interface with "Modem Switch"

- ★ Same Features as 101 Plus
- ★ Built in Serial Port for your Modem or other serial device
- ★ Switch between Serial Output and Parallel Output
- ★ Comes with cables to connect to your computer and printer
- ★ Can be powered by most printers

Model 105 Serial Switch

- ★ Connects to your COCO to give you 2 switch selectable Serial Ports
- ★ Comes with a 3 foot cable to connect to your computer
- ★ Now you can connect your Printer (or printer interface) and your Modem (or other serial device) to your COCO and flip the switch to use either device
- ★ Does not require power

Cassette Label Printing Program

- ★ New Version 2.1 prints 7 lines of information on Cassette labels
- ★ Comes on Tape with instructions to transfer to disk
- ★ Menu driven, very easy to use
- ★ Save and Load Labels from Tape and Disk
- ★ Uses the features of your printer to print standard, expanded, and condensed characters
- ★ Automatically Centers Each Line of Text
- ★ Allows editing of label before printing
- ★ Program comes with 24 labels to get you started
- ★ 16K ECB required

Some of the Printers

That Can –
Supply power for the 101 and 104 are Radio Shack, Star, Okidata, Brother, Juki, and Smith Corona.

Some of the Printers

That Cannot –
Supply power for the interfaces are Epson, Seikosha, Panasonic, Silver Reed and NEC. If your printer cannot supply power to the interface you can order your interface with the "P" option or you can supply your own AC adapter. We recommend the Radio Shack 273-1431 AC adapter with a 274-328 connector adapter.

Write or call for more information or for technical assistance.

Price List

Model 101	35.95
Model 101P	41.95
Model 104	44.95
Model 104P	51.95
Model 105	14.95
Cassette Label Program	6.95
Pin Feed Cassette Labels:	
White	3.00/100

4 Pin Din Serial COCO Cables:

Male/Male 6 foot	4.49
Male/Female 6 foot	4.49
Female/Female 6 foot	4.49
Other Lengths Available	

All items covered by a 1 year warranty

Ordering Info

- ★ **Free Shipping** in the U.S.A. (except AK and HI) on all orders over \$50
- ★ On orders under \$50 please add \$2.50 for shipping and handling
- ★ On orders outside the U.S.A. please write or call for shipping charges

You Can Pay By:

- ★ VISA or MasterCard
- ★ Or send check or money order payable in U.S. funds

**Metric Industries Inc.
P.O. Box 42396
Cincinnati, OH 45242**

(513) 677-0796

are moved on a byte-for-byte basis, this routine can be used in PMODE 3 or 4.

The PCOPY routine (lines 2700 through 2770) at \$6A00 copies all graphics from pages 5 through 8 to pages 1 through 4, two bytes at a time, and can be used with PMODE 3 or 4.

Routine R9 (lines 2790 through 2990) at \$6B00 copies a half-width image produced by R2 or R12 to both sides of graphics pages 5 through 8. R10 (lines 3010 through 3090) at \$6C00 copies a half-height image produced by R1 or R11 to the top and bottom of graphics pages 5 through 8. Both R9 and R10 work in either PMODE.

Routine R11 (lines 3110 through 3290) at \$7100 marks the beginning of the routines used solely for PMODE 3 pictures. This routine reduces a picture to one-half its height, but unlike the R1 routine for PMODE 4 it merely copies every other row. You can try using R1 in place of R11 to modify your picture and see which routine works better.

R12 (lines 3310 through 3700) at \$7200 reduces a picture to one-half its width by using every other nibble (two bits) in two consecutive bytes. The resulting byte is kept in a location called TEMP. The first graphics byte is stored in both Register A and Register B. Register B is then ANDed with 192 (128+64=192) to get the first color value that is then stored in TEMP. Register A is ANDed with 12 (8+4=12), shifted to the left twice, and then added to TEMP (lines 3420 through 3460). This puts the third color value in the original byte as the second color value in TEMP. Registers A and B are loaded with the next graphics byte, and again Register B is ANDed with 192. Moving four shifts to the right and adding the value to TEMP (lines 3490 through 3550) makes this color value the third value in TEMP.

Next AND Register A with 12, shift it twice to the right, and add to it the contents of TEMP (lines 3560 through 3590). This puts the final color value as the fourth color value in Register A. This routine continues until the entire picture is reduced to half its width.

The next routine, R14 (lines 3720 through 4220) at \$7400, flips a picture along the vertical axis. Not only each byte, but each nibble within that byte must be reversed. Again TEMP is used to store the partial results. Load registers A and B with the first graphics byte. AND Register A with 192 to get the first color value, then shift to the right six times and store the result in TEMP as the fourth color value (lines 380 through 390). Next AND the original value with 48 (32+16=48), shift to the right twice and add to TEMP as the third color value (lines 3920 through 3960). Now AND the original value with 12, shift to the left twice and add to

Press any key and enter 9 for a different four-corner mirror image. You can keep mirroring the image, but it starts to lose detail as the image becomes smaller.

TEMP as the second color value (lines 3980 through 4020). Finally, AND the original value with 3 (2+1=3), shift to the right six times and add the result with TEMP as the first color value (lines 4030 through 4100). Store this in the upper-right graphics corner of Page 5. Continue with the routine until the entire picture is rotated.

R15 (lines 4240 through 4780) at \$7500 mirrors the image from left and right. It is the same as the previous routine except Register Y is loaded with the upper-left graphics location of Page 5. The original byte is stored in the upper-left corner and the reversed byte is stored in the upper-right corner.

Up and Running

First type in the machine language program, Listing 1. When it's complete, check for errors by entering A/NO/NS/WE; when the program is error-free, assemble it with A MODIFY.BIN /NS. Next type in the BASIC program, Listing 2, and save it to disk as DOMODIFY.

As an example, we'll use the picture we saved in "The Assembly Line — Part I" as SCALEMAN.PIX. Run the BASIC program. Insert the disk with the picture in any drive and press ENTER. Then, as requested, type the PMODE value and press ENTER. Next type SCALEMAN.PIX and press ENTER. Select Drive 0 and press ENTER.

When the picture is loaded, press any key to get to the menu. Try entering 4 to see the picture reduced to the left-half of the screen. Press any key and then enter 1; now the picture is one-fourth of its original size in the upper-left corner of the screen. Press any key and enter 11 to restore the image. Press any key and enter 9 for a four-corner

mirror image. You can flip the picture before selecting the mirror image for a different effect. For example, press any key and enter 11; press any key and enter 7; and press any key and enter 9 for a different four-corner mirror image. You can keep mirroring the image, but it starts to lose detail as the image becomes smaller.

Go back to the original picture with Option 11 and enter 12 to switch PMODEs. Even without a color monitor you can see the artifact colors. Now try Option 9. Where are all the colors? Since the PMODE 4 half-width routine combines nibbles into one color bit, we lose any artifact coloring. Go back to the original picture and switch PMODEs. Now enter Option 9 and enter 12 to switch to PMODE 4. There are the artifact colors — a real example of serendipity.

Try loading other PMODE 4 or 3 pictures, modify them as you want, and then save them to disk as follows:

```
SAVE "filename.ext", &H0E00, &H25F
F, &HA027
```

You can load those pictures and in turn modify them. Feel free to make any changes in the machine language program. □

64K Disk



Listing 1: MODIFY

```
00100 *MODIFY
00110      ORG      $6100
00120 R1      LDX      #$E00
00130      LDU      #$2600
00140      CLRA
00150 R1L1     STA      DOWN
00160      CLRB
00170 R1L2     STB      ACROSS
00180      LDA      32,X
00190      LDB      ,X+
00200      PSHS     B
00210      ORA      ,S+
00220      STA      ,U+
00230      LDB      ACROSS
00240      INCB
00250      CMPB     #31
00260      BLS      R1L2
00270      LEAX     32,X
00280      LDA      DOWN
00290      ADDA     #2
00300      CMPA     #190
00310      BLS      R1L1
00320      LBRA     PCOPY
00330
00340      ORG      $6200
00350 R2      LDX      #$E00
00360      LDU      #$2600
00370      CLRA
00380 R2L1     STA      DOWN
00390      CLRB
00400 R2L2     STB      ACROSS
00410      CLRB
00420 TEST1   LDA      ,X+
00430      BITA     #192
```


00440	BEQ	TEST2	01210	ADDB	#8
00450	ADDB	#128	01220 T5	BITA	#8
00460 TEST2	BITA	#48	01230	BEQ	T6
00470	BEQ	TEST3	01240	ADDB	#16
00480	ADDB	#64	01250 T6	BITA	#4
00490 TEST3	BITA	#12	01260	BEQ	T7
00500	BEQ	TEST4	01270	ADDB	#32
00510	ADDB	#32	01280 T7	BITA	#2
00520 TEST4	BITA	#3	01290	BEQ	T8
00530	BEQ	NTEST	01300	ADDB	#64
00540	ADDB	#16	01310 T8	BITA	#1
00550 NTEST	LDA	,X+	01320	BEQ	FT
00560	BITA	#192	01330	ADDB	#128
00570	BEQ	TEST5	01340 FT	STB	.U
00580	ADDB	#8	01350	LEAU	-1,U
00590 TEST5	BITA	#48	01360	LDB	ACROSS
00600	BEQ	TEST6	01370	INCB	
00610	ADDB	#4	01380	CMPB	#31
00620 TEST6	BITA	#12	01390	BLS	R4L2
00630	BEQ	TEST7	01400	LEAU	64,U
00640	ADDB	#2	01410	LDA	DOWN
00650 TEST7	BITA	#3	01420	INCA	
00660	BEQ	FTEST	01430	CMPA	#191
00670	INCB		01440	BLS	R4L1
00680 FTEST	STB	,U+	01450	LBRA	PCOPY
00690	LDB	ACROSS	01460		
00700	INCB		01470	ORG	\$6500
00710	CMPB	#15	01480 R5	LDX	#\$E00
00720	BLS	R2L2	01490	LDY	#\$2600
00730	LEAU	16,U	01500	LDU	#\$261F
00740	LDA	DOWN	01510	CLRA	
00750	INCA		01520 R5L1	STA	DOWN
00760	CMPA	#191	01530	CLRB	
00770	BLS	R2L1	01540 R5L2	STB	ACROSS
00780	LBRA	PCOPY	01550	CLRB	
00790			01560 TT1	LDA	,X+
00800	ORG	\$6300	01570	BEQ	FTT
00810 R3	LDX	#\$E00	01580	BITA	#128
00820	LDU	#\$3DE0	01590	BEQ	TT2
00830	CLRA		01600	INCB	
00840 R3L1	STA	DOWN	01610 TT2	BITA	#64
00850	CLRB		01620	BEQ	TT3
00860 R3L2	STB	ACROSS	01630	ADDB	#2
00870	LDA	,X+	01640 TT3	BITA	#32
00880	STA	,U+	01650	BEQ	TT4
00890	LDB	ACROSS	01660	ADDB	#4
00900	INCB		01670 TT4	BITA	#16
00910	CMPB	#31	01680	BEQ	TT5
00920	BLS	R3L2	01690	ADDB	#8
00930	LEAU	-64,U	01700 TT5	BITA	#8
00940	LDA	DOWN	01710	BEQ	TT6
00950	INCA		01720	ADDB	#16
00960	CMPA	#191	01730 TT6	BITA	#4
00970	BLS	R3L1	01740	BEQ	TT7
00980	LBRA	PCOPY	01750	ADDB	#32
00990			01760 TT7	BITA	#2
01000	ORG	\$6400	01770	BEQ	TT8
01010 R4	LDX	#\$E00	01780	ADDB	#64
01020	LDU	#\$261F	01790 TT8	BITA	#1
01030	CLRA		01800	BEQ	FTT
01040 R4L1	STA	DOWN	01810	ADDB	#128
01050	CLRB		01820 FTT	STB	.U
01060 R4L2	STB	ACROSS	01830	STA	,Y+
01070	CLRB		01840	LEAU	-1,U
01080 T1	LDA	,X+	01850	LDB	ACROSS
01090	BEQ	FT	01860	INCB	
01100	BITA	#128	01870	CMPB	#15
01110	BEQ	T2	01880	BLS	R5L2
01120	INCB		01890	LEAX	16,X
01130 T2	BITA	#64	01900	LEAY	16,Y
01140	BEQ	T3	01910	LEAU	48,U
01150	ADDB	#2	01920	LDA	DOWN
01160 T3	BITA	#32	01930	INCA	
01170	BEQ	T4	01940	CMPA	#191
01180	ADDB	#4	01950	BLS	R5L1
01190 T4	BITA	#16	01960	LBRA	PCOPY
01200	BEQ	T5	01970		



More Baud Less Bucks Now Better

These Surprisingly Affordable 2400/1200/300 BPS Modems are now greatly improved. New Rockwell chip, non-volatile memory, impedance matching, expanded Hayes command set, etc.

These are high quality modems made by Zoom Telephonics in the USA, with performance features unmatched by competitors costing three times as much.

These are full-featured fully Hayes compatible modems that work with any computer. They include advanced digital signal processing, and adaptive equalization for great performance and reliability.

All of this in a compact, attractive go-anywhere package that's not much larger than a paperback book.

All the features which you expect in a state of the art modem. With a seven year mfg warrantee.

Money saving premiums for Delphi, GENIE, CompuServe, etc. Software available
ProcComm (PC) + 5 QuickLink (Mac) + 5
WizPro is free (shareware).

External modem \$115.00
Internal version (for PC) \$105.00

Please add: USA - shipping and handling \$3.50
Canada - Air PP and Insurance \$7.46

GCS FILE TRANSFER UTILITIES

now updated to Version 3.0

The GCS File Transfer Utilities provide a simple and quick method to transfer text and binary files from and to a variety of floppy disk formats.

Need to transfer files to and from PC (MSDOS), RSDOS, FLEX or MINI-FLEX disks on your OS-9 system? You need GCS File Transfer Utilities.

Commands Dir of PC,RS or FLEX disk
Dump disk sector of PC, RS or FLEX disk
Read file from PC, RS or FLEX disk
Write file to PC, RS or FLEX disk
Rename file on PC disk
Delete file from PC disk
Format PC disk

Version 3.0 handles most 5.25 and 3.5 formats.
Any level sub-directories (PC). Binary files.
Multi-Vue version can be used under Multi-Vue as stand alone Shell commands.

Requires OS-9 L2 for COCO 3 L1 for COCO 1/2
2 drives (one can be hard or ramdisk,
one floppy 40 T DD DS).
Multi-Vue for Multi-Vue version.
D. P. Johnson SDISK3 for COCO 3
SDISK for COCO 1 or 2

GCS File Transfer Utilities for CoCo
Multi-Vue version \$54.95
Standard version \$44.95
Version 3.0 update - either version
(provide disk number) \$15.00

D. P. Johnson Software
SDISK or SDISK3 \$29.95
L1 & L2 Utilities \$75.00
Ask about FORTH09 (6809 & 68K)

Standard diskettes are OS-9 format (5.25") - add \$2.50 for 3.5". Orders must be prepaid or COD. VISA/MC accepted.
Add \$1.75 S&H. COD is additional.

GRANITE COMPUTER SYSTEMS
Route 2 Box 445 Hillsboro, NH 03244
(603) 464 - 3850

OS-9 is a trademark of Microware Systems Corporation
and Motorola Inc. MS-DOS is a trademark of Microsoft
Corp. FLEX is a trademark of TSC, Inc.

88 THE RAINBOW June 1990


```

04290 R15L1 STA DOWN
04300 CLR LB
04310 R15L2 STB ACROSS
04320 CLR LB
04330 LDA ,X+
04340 STA ,Y+
04350 BEQ R15L3
04360 TFR A,B
04370 ANDA #192
04380 LSRA
04390 LSRA
04400 LSRA
04410 LSRA
04420 LSRA
04430 LSRA
04440 STA TEMP
04450 TFR B,A
04460 ANDA #48
04470 LSRA
04480 LSRA
04490 ADDA TEMP
04500 STA TEMP
04510 TFR B,A
04520 ANDA #12
04530 LSLA
04540 LSLA
04550 ADDA TEMP
04560 STA TEMP
04570 ANDB #3
04580 LSLB
04590 LSLB
04600 LSLB
04610 LSLB
04620 LSLB
04630 LSLB
04640 ADDB TEMP
04650 R15L3 STB ,U
04660 LEAU -1,U
04670 LDB ACROSS
04680 INCB
04690 CMPB #15
04700 BLS R15L2
04710 LEAX 16,X
04720 LEAY 16,Y
04730 LEAU 48,U
04740 LDA DOWN
04750 INCA
04760 CMPA #191
04770 BLS R15L1
04780 LBRA PCOPY
04790
04800 TEMP RMB 1
04810 DOWN RMB 1
04820 ACROSS RMB 1
04830 END R1

```

✓	70	.....	247
	120	.....	13
	160	.....	33
	240	.....	95
	320	.....	74
	END	.....	234

Listing 2: DOMODIFY

0 *COPYRIGHT 1990, FALSOFT INC.
10 IF PEEK(&H6100)<>142 THEN LOA

```

DM"MODIFY"
20 PCLEAR 8: CLEAR 200, &H6100-1
30 CLS: PRINT: PRINT "INSERT DISK W
ITH PICTURE IN ANY DRIVE THEN
PRESS ANY KEY...": EXEC &HADFB
40 PRINT: INPUT "PMODE (3,4) -"; P
M: IF PM<3 OR PM>4 THEN 40
50 INPUT "FILENAME.EXT -"; NM$: IF
LEN(NM$)>12 THEN 50
60 INPUT "DRIVE # (0-4) -"; DR$: IF
VAL(DR$)<0 OR VAL(DR$)>4 THEN 60
70 PMODE PM, 1: PCLS: SCREEN 1, 1: LOA
DM NM$+"": "+DR$
80 EXEC &HADFB
90 EXEC &H6700
100 CLS: PRINT TAB(8) "PICTURE OPTI
ONS"
110 PRINT " 1> HALF HEIGHT", " 2>
MIRROR TOP/BOTTOM", " 3> COPY TO
P/BOTTOM", " 4> HALF WIDTH", " 5>
MIRROR LEFT/RIGHT", " 6> COPY LE
FT/RIGHT", " 7> FLIP TOP/BOTTOM",
" 8> FLIP LEFT/RIGHT", " 9> MIRRO
R FOUR CORNERS", "10> COPY FOUR C
ORNERS"
120 PRINT "11> BACK TO ORIGINAL",
"12> SWITCH PMODE": PRINT: LINEINP
UT "ENTER DESIRED OPTION (1-12)?
": Q$: Q=VAL(Q$): IF Q<1 OR Q>12 TH
EN 100
130 IF PM=3 THEN ON Q GOTO 260, 3
30, 270, 280, 320, 290, 300, 310, 340, 3
50, 360, 370
140 ON Q GOTO 150, 220, 160, 170, 21
0, 180, 190, 200, 230, 250, 240, 370
150 PMODE 4, 5: PCLS: EXEC &H6100: GO
TO 380
160 EXEC &H6100: EXEC &H6C00: GOTO
380
170 PMODE 4, 5: PCLS: EXEC &H6200: GO
TO 380
180 EXEC &H6200: EXEC &H6B00: GOTO
380
190 EXEC &H6300: GOTO 380
200 EXEC &H6400: GOTO 380
210 EXEC &H6200: EXEC &H6500: GOTO
380
220 EXEC &H6100: EXEC &H6600: GOTO
380
230 EXEC &H6200: EXEC &H6500: EXEC
&H6100: EXEC &H6600: GOTO 380
240 EXEC &H6800: GOTO 380
250 EXEC &H6100: EXEC &H6200: EXEC
&H6900: GOTO 380
260 PMODE 3, 5: PCLS: EXEC &H7100: GO
TO 380
270 EXEC &H7100: EXEC &H6C00: GOTO
380
280 PMODE 3, 5: PCLS: EXEC &H7200: GO
TO 380
290 EXEC &H7200: EXEC &H6B00: GOTO
380
300 EXEC &H6300: GOTO 380
310 EXEC &H7400: GOTO 380
320 EXEC &H7200: EXEC &H7500: GOTO
380
330 EXEC &H7100: EXEC &H6600: GOTO
380
340 EXEC &H7200: EXEC &H7500: EXEC
&H7100: EXEC &H6600: GOTO 380
350 EXEC &H7100: EXEC &H7200: EXEC
&H6900: GOTO 380
360 EXEC &H6800: GOTO 380
370 PM=(PM AND 1)+3
380 PMODE PM, 1: SCREEN 1
390 EXEC &HADFB
400 GOTO 100

```

PERRY COMPUTERS The Ideal Buy 1-800-248-3823

TANDY COMPUTERS

Tandy 1000-HX 256K 5 1/4"	549.00
Tandy 1000-SL/2 512K 3 1/2"	755.00
Tandy 1000-TL/2 640K 3 1/2"	955.00
Tandy 1100FD Portable	805.00
Tandy 1400FD Portable	1210.00
Tandy 1400HD Portable	1975.00
Tandy 2500XL 1 Meg 3 1/2"	1239.00
Tandy 4016 SX 1 Meg 3 1/2"	1495.00
Tandy 4016 DX 1 Meg 3 1/2"	2235.00
Tandy 4020-LX 1 Meg 3 1/2"	2950.00
Tandy 4025 LX 2 Meg 3 1/2"	3650.00
Tandy 4033 LX 2 Meg 3 1/2"	5049.00
Tandy 5000MC 2 Meg 1 Drive	3825.00
Tandy 5000MC 2 Meg 84 Meg	5395.00
Tandy 102 24K	435.00
Tandy Color 3 128K	155.00
WP-2 Wordprocessor	285.00
WP-100 Wordprocessor	495.00

MONITORS & CARDS

VM-5 Monochrome Green	115.00
CM-5 Color RGB	220.00
CM-11 Color RGB	315.00
Magnavox 9CM053 Color EGA	370.00
Packard Bell Monochrome TTL	89.00
Paradise Basic EGA Card	99.00

DISK DRIVES

5 1/4" External Drive 1000HX	180.00
Tandy 20 Meg Hard Card	450.00
30 Meg Hardcard	395.00
Welltec 5 1/4" for Tandy 1400	215.00
Seagate 20 Meg Drive & Card	269.00

MODEMS

Prac. Peripherals 1200B Internal	75.00
Prac. Peripherals 2400B Internal	175.00

PRINTERS

DMP-107 Dot-Matrix	210.00
DMP-133 Dot-Matrix	279.00
DMP-300 Dot-Matrix	479.00
Epson LX-810 Dot-Matrix	195.00
Epson FX-850 Dot-Matrix	365.00
Epson LQ-510 Dot-Matrix	345.00
Epson LQ-850 Dot-Matrix	585.00
Epson FX-1050 Dot-Matrix	485.00
Panaonic KX-P1180 Dot-Matrix	195.00
Panasonic KX-P1191 Dot-Matrix	265.00
Panasonic KX-P1124 Dot-Matrix	329.00

All prices and offers may be changed or withdrawn without notice. Advertised prices are cash prices. C.O.D. accepted add 2% (minimum charge \$10.00). M.C., Visa add 2%. All non-defective items require return merchandise authorization. Call for RMA Number before returning. Delivery is subject to product availability. Add 1 1/2% for shipping and handling. \$5.00 minimum charge.

TM - Registered Trademark of Tandy, Epson, and IBM
Monday thru Friday 9am - 5pm EST.

PERRY
COMPUTERS
124 South Main Street, Perry, MI 48872
CALL 1-517-625-4161 or TOLL-FREE
1-800-248-3823

The Intercom

An important link in the CoCo community is its ability to communicate with fellow users. If questions arise, a fresh source of information can be invaluable. We here at THE RAINBOW have decided to create "Intercom," an information exchange point for Pen Pals, CoCo Clubs and BBSs.

If you would like a Pen Pal or are running a CoCo Club or BBS, send us a letter including the information listed here to: The Rainbow Intercom, P.O. Box 385, Prospect, KY 40059.

Only those parties who have signed our non-piracy "agreement form" appear in listings of Intercom. Also, please notify us if you want to add or delete any names on this list.

Pen Pals

• I have a CoCo 3 (512K), FD-500 dual disk drives, DMP-105 and a modem. I am 51 years old and enjoy communicating with people about the CoCo or life in general. I will return all letters sent to me either via hard copy or letters on disk in BASIC format.

Edward G. Russell
192 Stadium Park
Key West, FL 33040

• I have a CoCo 3, FD-501 drive and a DMP-106 printer. I would enjoy pen pals from anywhere in the world. I am 28 years old. I will answer all letters.

Richard Butler
702 North Cass
Mount Airy, IA 50854

• I am 25 years old and I'm a physical therapist. I would like to contact people who are interested in working with the handicapped.

Newton Luiz Nickel
Dias da Rocha Filho, 39 apt.:04
Curitiba, Parana, Brazil 80040

• I am interested in having a pen friend with a CoCo 3. This person should be able to help teach German and/or be from West Germany. I would like to correspond with someone who knows and understands how to apply mathematical functions such as sin, cos, tan,

etc... in graphics applications.

Fred J. Slagle
1900 Boatmans Ridge Rd.
Morristown, TN 37814

• I'm 15 and have a CoCo 3, CoCo 2, DMP-130, FD-502 and a CCR-81 cassette recorder. I like most games, but my favorites are Adventures. I am looking for pen pals for the exchange of ideas and CoCo information. I will answer all letters. No age limits.

Alan Leboff
519 Highland Ave.
Malden, MA 02148

• I am 14 and would like pen pals from all over the world. I have a CoCo 2, FD-502 disk drive, DCM-6 modem and a Gemini 10X printer. I enjoy using CoCo and Nintendo. My other interests are electronics, AD&D and forming a BBS.

Richard Melnick
P.O. Box 1620
Greenwood, N.S.
B0P 1N0
Canada

• I live in Argentina, I'm 15 years old, and I have a CoCo 2, one disk drive, a DMP-105 and a CCR-81 cassette recorder. I love Adventure games and astron-

omy studies. I want to exchange letters of any theme, with pen pals of my age from the United States. I'll try to answer all letters.

Raul Eduardo Gonzalez
1224 Maestro Vidal Ave.
B Los Platanos 5010
Cordoba, Argentina

• I am 17 years old and have a Dragon 64 (nearly identical to CoCo 1 and 2) disk drive and OS-9. I would like to get in touch with CoCo and Dragon users all over the world. My particular interests are music, programming and all games.

Ola Eldoy
Stokken
N-5410 Sagvag
Norway

• I am 16 years old and looking for pen pals anywhere. I have a 128K CoCo 3, disk drive and cassette recorder. I love games and Adventures.

Robert A. Young
Birch Hill Farms
Hwy #9, RR2
Mildmay, ON N0G 2J0
Canada

CoCo Clubs

ARIZONA

♦ Tucson Color Computer Club, Bruce Smith, 3030 Mustang Dr., Tucson, 85708, (602) 747-7859

CALIFORNIA

♦ Citrus Color Computer Club, Orville Beaver, P.O. Box 6991, San Bernardino, 92412-6991, (714) 685-6334

♦ Color America Users Groups, Jack W. Eizenga, 3811 N. Foster Ave., Baldwin Park, 91706-3912, (818) 960-8010

♦ Marysville/Yuba City Area CoCo Club, Jim Vestal, P.O. Box 5126, Marysville, 95901, (916) 742-5499

CONNECTICUT

♦ South Eastern Connecticut Color Computer Users Group, Larry Donovan, 25 Stony Brook Rd., Stonington, 06378, (203) 535-4211

FLORIDA

♦ Cross-Country Color Computer Club, Tom Tittle, 860 Gardenia Dr., Royal Palm Beach, 33411, (407) 798-3726

GEORGIA

♦ Atlanta Computer Society, Inc., Alan R. Dages,

4290 Bells Ferry Rd. Suite 10639, Kennesaw, 30144, (404) 469-5111(voice), (404) 636-2991(modem)

IDAHO

♦ Snake River Color Computer Club, Emil Franklin, 1750 Carmel Dr., Idaho Falls, 83403, (208) 522-0220

ILLINOIS

♦ Chicago OS-9 Users Group, Roger C. Halvorsen, 1598 Ardmore Ave., Glendale Heights, 60139, (708) 469-8174

♦ Cook County Color Computer Club, Howard Luckey, 10 McCarthy Rd., Park Forest, 60466-2122, (708) 747-0117

♦ Motorola Micro Computer Club, Steve Adler, 1301 East Algonquin Rd., Schaumburg, 60196, (708) 576-3044

♦ Quincy Color Computer Club, Steve Wellman, 1600 Highland Lane, Quincy, 62301, (217) 224-8307

♦ Starved Rock Color Computer Club, Neal Roberts, 1250 E. Bluff, Marseilles, 61341, (815) 795-4894

IOWA

♦ Metro Area Color Computer Club, Joe Cavallaro, 2425 Ave. A, Co. Bluffs, 51501, (712) 322-2438

♦ Mid Iowa CoCo, Terry Simons, 1328 48th, Des Moines, 50311, (515) 279-2576

LOUISIANA

♦ The CoCo Sig, Christopher Mayeux, 20 Gibbs Dr., Chalmette, 70043, (504) 277-6880(voice) or (504) 277-5135(modem)

MARYLAND

♦ Arkade, John M. Beck, 3513 Terrace Dr. #D, Suitland, 20746, (301) 423-8418

MICHIGAN

♦ Color Computer Owners Group, Bernard A. Patton, 388 Emmons Blvd., Wyandotte, 48192, (313) 283-2474

♦ Greater Lansing Color Computer Users Group, E. Dale Knepper, P.O. Box 14114, Lansing, 48901, (517) 626-6917

NEW YORK

♦ The Island CoCo Club, Dennis Zobel, P.O. Box 426, Massapequa, 11762

♦ Kings Byte CoCo Club, Morty Libowitz, 1063 E. 84th St., Brooklyn, 11236, (718) 763-4233

NORTH CAROLINA

◆Norca Users Group, Matthew Royal, Rt. 21 Box 906, Fayetteville, 28304, (919) 484-1230

OHIO

◆Dayton Area Color Computer Users Group, John Teague, 308 Orangewood Dr., Kettering, 45429, (513) 434-9168

◆Dayton Color Computer Users Group, Steven E. Lewis, 4230 Cordell Dr., Dayton, 45439, (513) 299-3060

◆The Greater Toledo Color Computer Club, Bill Espen, 1319 North St., Bowling Green, 43402, (419) 471-9444

◆Tri County Computer User Group, Ron Potter, 10914 Oliver Rd., Cleveland, 44111, (216) 476-2687

PENNSYLVANIA

◆Cumberland Valley Users Group, Thomas Martin, 9085 Newburg Rd., Newburg, 17240, (717) 423-5525

◆Pittsburgh Color Group, Ralph Marting, 309 Frazier Dr., Pittsburgh, 15235, (412) 823-7607

RHODE ISLAND

◆New England "CoCoNuts" Color Computer Club, Arthur J. Mendonca, P.O. Box 28106 North Station, Providence, 02908, (401) 272-5096(Sig3)

SOUTH CAROLINA

◆Spartanburg CoCo Club, Jesse W. Parris, 152 Bon Air Ave., Spartanburg, 29303, (803) 573-9881

SOUTH DAKOTA

◆Empire Area Color Computer Users Group of South Dakota, Carl Holt, P.O. Box 395, Brandon, 57005, (605) 582-3862

TEXAS

◆The Codis CoCo Symphony, William C. Garretson, 2902 Harvard St., Irving, 75062, (214) 570-0823

◆Mid Cities TRS-80 Users Group, Rob Yoder, P.O. Box 171566, Arlington, 76003, (817) 535-7931

VIRGINIA

◆Richmond Area Color Computer Organization, William T. Mays Jr., 6003 Westbourne Dr., Richmond, 23230, (804) 282-7778

◆Southwestern Virginia Color Computing Club, Ricky Sutphin, Route 1 Box 20, Henry, 24102, (703) 365-2018

WASHINGTON

◆Spokane Color Computer Club, Richard Baysinger, W. 2217 Sanson, Spokane, 99205, (509) 326-2793 or BBS#(509) 325-6787

WEST VIRGINIA

◆Huntington Area Color Computer Symposium, Jim Bush, P.O. Box 391, Lesage, 25537-0391, (304) 736-5314

AUSTRALIA

◆Australian National OS-9 Users Group, Gordon Bentzen, C/- 8 Odin Street, Sunnybank, Queensland, 4109, (07) 345-5141

◆Brisbane Southwest Colour Computer Users Group, Bob Devries, 21 Virgo St., Inala, Queensland, 4077, (61)-7-3727816

CANADA

◆Halifax Dartmouth Color Computer Users Group, David H. Haley, Comp. #7 Greenforest Subdivision, RR#1 Lower Sackville, Nova Scotia, B4C 2S6, (902) 864-0454

◆Les CoCophiles Du Sud-Ouest, Jean Labrose, 20 Ste-Julie#A, Vaudreuil, Quebec, J7V 1B5, (514) 455-0486

PUERTO RICO

◆Puerto Rico Color Computer Club, Luis R. Martinez, P.O. Box 2072, Guaynabo, 00657-7004, (809) 799-8217 or (809) 728-2314

BBSs

State/City	BBS Name	Access Number	Parameters (Baud rate-Parity-Word Bits-Stop Bits)	SysOp
Arizona				
Peach Orchard	Comm. Central BBS HST	(501)249-3814	300/19,200-N-8-1	Perry Parsons
California				
Marysville	09-Online BBS	(916)742-6809	300/1200-N-8-1	Jim Vestal
Colorado				
Colorado Springs	The Time Safari	(719)635-7228	300/1200-N-8-1	David Vallier
Florida				
Miami	A Little R S R	(305)266-1099	300/1200-N-8-1	Robert Jones/Robert Caraballo
Kansas				
Beloit	Kansas Konnektion BBS ¹	(913)738-5613	300/1200-N-8-1	Gary N. McCarty
Massachusetts				
Worcester	Gosub BBS	(508)756-1442	300/1200/2400-N-8-1	Richard Bostock
Michigan				
Taylor	J & L's CoCo Corner	(313)292-4713	300/1200/2400-N-8-1	Jim Snider
Minnesota				
Brainerd	Brainerd 4-Way ²	(218)828-1144	300/1200/2400-N-8-1	Mike Lowe
New Hampshire				
Allenstown	The CoCoBean BBS	(603)485-8682	300/1200/2400-N-8-1	David Bean
New Jersey				
High Bridge	Hilltop BBS	(201)638-5698	300/1200/2400-N-8-1	Guy Silliman
Mercerville	TAO BBS	(609)587-2672	300/1200/2400-N-8-1	Bob Watson
Ohio				
Bellaire	The Phantasm BBS	(614)676-2505	300/1200/2400/9600-N-8-1	Dave Roth
Oklahoma				
Tecumseh	Pat BBS ³	(405)598-5082	300-N-8-1	Pat Aldridge
Pennsylvania				
Johnstown	CoCo Electronic BBS ⁴	(814)535-1497	300/1200/2400-N-8-1	Albert Baldish
Palmer	ASCII =80=	(215)252-1608	300/1200/2400-E-7-1	Nevin Keller
Tennessee				
South Pittsburg	Base-Net BBS	(615)837-8352	300/1200/2400-N-8-1	Howard Bacon
Virginia				
Henry	Public Access ⁵	(703)365-2018	300/1200-E-7-1 or N-8-1	Ricky Sutphin
Wisconsin				
Gays Mills	CoCo BBS	(608)735-4509	300/1200/2400-N-8-1	Robert & Daven Howard
Marshall	Madison Tandy Users BBS	(608)655-3806	300/1200/2400-N-8-1	Fran Selje
Canada				
Lunenburg, N.S.	Color Nova BBS	(902)634-3095	300/1200/2400-N-8-1	John D. Cleveland

Notes:

¹Kansas Konnektion BBS is up from 10 p.m. to 7 a.m.

²Brainerd 4-Way is up from 8 p.m. Saturday to 5 p.m. Friday.

³Pat BBS is up 5 p.m. to 9 p.m. weekdays and 10 a.m. to 10 p.m. weekends. This new BBS is counting on you for uploads.

⁴CoCo Electronic BBS is up 8 p.m. to 6 a.m. seven days a week.

⁵Public Access is up from 12:30 a.m. to 9 a.m. Monday through Sunday.

OS-9 Uploads Growing

by **Eddie Kuns**
CoCo SIG Database Assistant

General Information (in the OS-9 SIG): **Jim Sanford** (WB4GCS) posted two articles: one about Delphi's online help facility, the other describing how to install the Tandy Smart-Watch into the CoCo. **Brian White** (BRIANWHITE) contributed an archive of OS-9 SIG forum messages about the CoCo 4. **Paul Ward** (PKW) submitted changes and enhancements to *Start OS-9*. **Warren Moore** (WJMOORE) contributed a file of humorous business terms.

Applications: **Mike Sweet** (DODGE-COLT) released Version 1.6 of the *Ed* word processor. This version fixes some bugs in Version 1.5, and is less than 16K. **Bernie Beshorse** (PROA) posted a *DynaCalc* template to help keep track of your budget and checks. Paul Ward contributed a BASIC09 program to calculate studio room reverb times as a function of octave and surface treatment of the studio's walls. **Hugo Bueno** (MRGOOD) submitted the game *Scramble*. **John Barrett** (JBARRETT) posted a public-domain version of *Surveyor*, an application for civil engineers and surveyors.

Utilities: **Roger Krupski** (HARDWARE-HACK) contributed a new CC3Go module for OS-9 Level II. This new version allows you to specify the parameters CC3Go passes to the initial shell. Jim Sanford submitted *Move*, a utility that moves a file to a different directory on the same disk. **Tim Fadden** (07ESRTIMOTHY) posted a new version of a spooling program suitable for installation in the startup file. RMA source is

included. **Bruce Isted** (BRUCEISTED) gave us an updated version of Bob Santy's RS-DOS utility to transfer files between RS-DOS and OS-9 disks. **Jeff Blower** (SEBJMB) released a BASIC09 procedure that uses Pete Lyall's *HDKit* to make hard drive back-up and restoring a breeze yet simplifies the *HDKit* interface. **Zack Sessions** (ZACKSESSIONS) showed us a turbo-charged version of *SDir* (Super Directory). This version runs three to five times faster than the previous release. It offers all of the standard *dir* options plus many more. **Phil Zeigler** (PHILZEIGLER) contributed Vaughn Cato's program to unzip the new PKZIP-101 archives compressed in the implosion format. **Mike Huskey** (KINGTRENT) posted a replacement for *wcreate*. **Jay Truesdale** (JAYTRUESDALE) submitted a complete listing (current to December 1, 1989) of the utilities database, giving the complete description of each file. This list is uploaded in both the PAK and AR archive formats.

Device Drivers: Jay Truesdale sent a listing of the Device Drivers database.

Patches: The must-get of the month is the *IPatch* file (and accompanying bouncing ball demo) for *grfdrv*, released by **Kevin Darling** (KDARLING). This patch to the OS-9 windows graphics driver speeds operation in graphics windows up to 10 times. Mike Sweet posted a patch to this patched version of *grfdrv* to allow for 25-line text screens (not graphics windows) and a patch to *GShell+* Version 1.24A to allow it to take advantage of the speed of the patched *grfdrv*. Phil Zeigler released a new version of CC3Go that allows you to protect your OS-9 boot with a password.

Telecommunications: **Wayne Laird** (WAYNELAIRD) submitted a list of OS-9 BBSS. **Eddie Kuns** (EDDIEKUNS) released *KBCom* Version 1.0.0, a new terminal program for OS-9 that emulates the VT100

and VT52 terminals. **Bill Brady** (OS9UGED) released a faster version of *WPXMod*, *Xmodem* for *WizPro*. Jay Truesdale sent an archived directory listing for the Telcom database.

Graphics & Music: **Robert Loudon** (KURSE) posted a GIF picture file of part of the Mandelbrot set. **Brian Wright** (POLTERGEIST) contributed a GIF picture of Seattle. **Mike Knudsen** (RAGTIMER) released Version 4.5.0-B of the *UltiMusE III* JukeBox CD Player, which fixes a bug in Release 4.5.0 that sticks you in a long play list. Brian Wright submitted a collection of MAC sound files. **Eric Stringer** (NES) posted three pictures produced by his new video digitizer, including one of the *Teenage Mutant Ninja Turtles*. **Doug Fraser** (LDF) contributed three Christmas hymns: "Angels We Have Heard on High," "O Come All Ye Faithful" and "What Child is This?" **Kelly Thompson** (KMTOMPSON) submitted "Carol of the Bells," to be played with *UltiMusE*. **Paul Duncan** (PDUNC) posted a composition by Scarlatti. Brian White was busy this month. He released a *Star Trek* game, a screen saver program ported from UNIX and *Show*, a program that allows you to view BIN, MAC and VEF format pictures. *Show* is expandable and allows you to view pictures larger than one screen. **Mike Haaland** (MIKEHAALAND) contributed C routines for loading and saving Get/Put buffers with VEF and VEFsquash picture data. He also posted *DigiView* Version 1.3, a program to display DS-69 256-by-256 and 128-by-128, 16-level grey scale pictures. Doug Fraser submitted a musical rendition of Pachelbel's "Canon in D." Warren Moore contributed a humorous demo of BASIC09's Get/Put buffers.

Programmers Den: Zack Sessions released the latest version of Bob van der Poel's RMA assembler library. This version includes C-like string handling, numeric

Eddie Kuns is pursuing a PhD in physics at Rutgers University. He lives in Aurora, Illinois and works as a programmer and researcher at Fermilab. Eddie is co-manager of the CoCo SIG; his username is EDDIEKUNS.

conversion, math and full documentation. **Glen Hathaway** (COMPER) posted an orbit program including C source.

68K-OS9: Jay Truesdale submitted a demo of D.P. Johnson's FORTH09/68000.

CoCo SIG

General Database: **Matt Royal** (TH-EREB) contributed a message downloaded from a BBS telling the tale of "The Modern Civil War."

CoCo 3 Graphics: **Tommie Taylor** (TOMMIETAYLOR) posted a *CoCo Max 3* picture of the CoCoNuts BBS in Fayetteville, North Carolina. **Joe Walker** (JDWALKER) submitted two demos of *SuperSound*. **Gerald Young** (THEVOY-AGER) released an updated version of CDUMP16.ARC, a screen dump utility. **Donald Ricketts** (STEVEPDX) contributed several 640-format pictures of TV women including Paula Abdul and Farrah Fawcett. **Larry Moore** (LDMOORE) posted a collection of

pictures from the *Strip Poker* game along with a utility to view them. **Randy Cassel** (BBTROLL) uploaded several digitized female teen heartthrobs including Debbi Gibson and Staci Keenan.

Utilities & Applications: **Bryan Stephens** (BRSTEPHENS) submitted *Ledger3*, a spreadsheet program for the CoCo 3. **Frances Calcraft** (FRAN-CALCRAFT) released an updated CoCo 3 monitor program that allows you to examine and alter memory. **Gary Nelson** (RAIN-MAN) contributed a machine-language program to print disk directory labels. **Eric Stringer** posted the newest version of Wayne Setzer's mailing list manager for the CoCo. This program keeps track of addresses and prints them out on labels. **James Woodward** (JIMWOOD) submitted a program to factor an integer into prime numbers.

Games: **Eric Stringer** contributed the newest version of *Robot Zap* for the CoCo 2 and 3. **Hank Walther** (COCOHAM) posted

a BASIC program to move *Predator* to disk and run it.

Music and Graphics: **Jim Pogue** (JIM-POGUE) submitted an executable music file that plays "O Holy Night." **Doug Fraser** contributed a collection of *Lyra* music files. **Gary Poskocil** (GPOS) uploaded several Orchestra-90 Christmas carols including "Carol of the Bells" and "O Come All Ye Faithful."

Help: **Don Hutchison** (DONHUTCHISON) posted a file explaining the standards for uploading material to the databases in the CoCo SIG.

Product Reviews & Announcement: **Bren Stockdale** (BRENNERS) submitted a brief description of the new XPort interface from Orion Technologies.

Telecommunications: **Malcolm Heath** (MACHEATH) contributed a patch to allow all versions of *WEFAX* to use SCREEN 1.1. **Wayne Laird** uploaded a list of BBSS for the Color Computer.



* EXTENDED * ADOS-3

* Built-in RAMdisk * Point-and-pick file select menu *

Not a new version of ADOS-3, but a new product that shares space with ADOS-3 in a 16K EPROM. Arrow-key selection of files to execute. LOAD, COPY, KILL or SCAN. The BACKUP command is doubled in speed for full disks, proportionately faster for partly full disks. (BACKUPS to or from the RAMdisk typically take 5 to 20 sec.) • BACKUP-with-format • Wild-card COPY and KILL, with optional prompting for individual files • Date (or date/time with hardware clock) displayed for files in the directory, printed on LISTS • DATES function • Key repeat • Block move/copy of BASIC program lines • Text screen printer dump • Auto-reboot of a BASIC program or the DOS command • Parallel printing • Read/write/format 35/40 tracks on 80-track drives • Supports 3 double-sided drives plus 2 RAMdrives • Allows different numbers of tracks on different drives • Shares the original's excellent compatibility with commercial software. For 128K CoCo 3 with ADOS-3 (RAMdisk use requires 512K). Includes information on having an EPROM burned (cost is \$15) after configuring Extended ADOS-3. Disk, \$39.95. Extended ADOS-3 plus ADOS-3, \$64.95. Driver for Disto real-time clock, \$5. Adapter for controllers lacking 28-pin socket, \$10. SmartWatch real-time clock (Tandy 25-1033 equiv.), \$35 (Drivers for Ext. ADOS-3 and OS-9 included; usable in 28-pin socketed controllers or in Rompack, \$10).

"...will blow your socks off...impossible to give Extended ADOS-3 anything other than a rave review."

— Rainbow, October 1989.

"Flawless, compatible operation with just about everything under the sun...by far the most USEFUL product ever devised for the Color Computer."

— CoCo Clipboard, Sept/Oct 1989.

ADOS-3 (reviewed July 1987)

Customize default startup message, colors, screen width, baud rate, step rates, processor speed, number of tracks (35, 40, or 80). Disk I/O and printing are reliable at double CPU speed. Extra commands such as FAST, SLOW, AUTO, RUNM, SCAN, CAT, PRT ON/OFF. Keystroke macros, arrow-key scroll through BASIC programs, edit/repeat of last command, auto-edit of error line. ML monitor, lots more. Usable as a disk utility or in EPROM. 128K CoCo 3. EPROM-burning (cost is \$15-20) information provided. Disk, \$34.95.

ADOS for CoCo 1 and 2 Disk, \$27.95.

FOROS-9: SmartWatch real-time clock with driver, \$30.00; in Rompack, \$40.00.

SPECTROSYSTEMS



11111 N. Kendall Dr.
Suite A108
Miami, FL 33176
(305) 274-3899

PLEASE ADD \$2 SHIPPING • NO DELAY ON PERSONAL CHECKS
WE CANNOT ACCEPT CREDIT CARDS

MVCanvas 2.0 - OS-9 Paint Program

Finally, a professional OS-9 Level II paint program is available for the Color Computer 3. **MVCanvas** not only supports true windows, **MVCanvas** is the **ONLY** Color Computer graphic editor that gives you more choices than just a 320 by 200 pixel, 16 color graphic resolution. *

Now with **MVCanvas**, the graphic editing power found only under RSDOS based products is married with the benefits of a multitasking windowing environment to produce one of the most versatile and powerful graphic packages available to the Tandy Color Computer 3 user!

MVCanvas is a mouse/joystick/keyboard driven graphic editor for the OS-9 Level II, Multi-View windowing environment.

MVCanvas features include:

- o Multiple Screen resolutions: (Four different Resolutions) *
640 by 200 with 2 or 4 colors & 320 by 200 using 4 or 16 colors.
- o Mouse/joystick/keyboard controlled.
- o Select up to 16 colors out of a palette of 64.
- o IMG (Rascan) digitized picture importing
- o VEF Graphics format & VEF Squashing (Compression)
- o Palette animation and Remap
- o Instant grey scaling (in 640x200 mode)
- o Multiple Font support
- o Clipboard includes Copy, Cut & Paste, Flips, Invert and Remap
- o Plain, inverse, transparent, bold, underline & proportional text
- o Drawing features include: Circle, Ellipse, Radians, Lines, Pencil, Brush, Fill, Erase, Spray, Box, Bar and Stamps.
- o Printers supported: Epson, DMP (Tandy), IBM, Gemini, Star & Clitch

System Requires: CoCo3, OS-9 LVL II, Disk Drive, 512K

Only \$49.95!! + \$3.00 S/H Nev. Res. add 6.5% sales tax, C.O.D. Orders Add \$2.50

Send Check/Money order to:
Hyper-Tech Software / 4341 Gannet Cir #174 / Las Vegas, NV 89103
Phone: (702) 362-5346

Still pounding away at that keyboard?



Save Time and Money with a Combination Subscription!

SAVE up to 19%

when you buy a joint subscription to the magazine and either RAINBOW ON TAPE or RAINBOW ON DISK! A one-year subscription to THE RAINBOW and RAINBOW ON TAPE is only \$91 in the U.S., \$108 in Canada, \$153 foreign surface rate and \$188 foreign airmail. A one-year subscription to THE RAINBOW and RAINBOW ON DISK is only \$115 in the U.S., \$138 in Canada, \$183 foreign surface rate and \$218 foreign airmail.*

Every month, these convenient services bring you as many as 24 ready-to-run programs. Using the current issue of THE RAINBOW as documentation, all you have to do is load and run them. A one-year combination subscription to THE RAIN-

BOW and RAINBOW ON TAPE or RAINBOW ON DISK give you more than 230 new programs! The typing time you save can be spent enjoying your CoCo!

RAINBOW ON TAPE For No-Fuss Fun

Back issues of RAINBOW ON TAPE are available beginning with the April 1982 issue. A single copy of RAINBOW ON TAPE is \$10 within the United States; U.S. \$12 in all other countries. The annual subscription rate for RAINBOW ON TAPE is \$80 within the U.S.; U.S. \$90 in Canada; and U.S. \$105 for all other countries.*

RAINBOW ON DISK Offers OS-9 Programs

In addition to all the programs offered on tape, part of one side of RAINBOW ON DISK is formatted for the OS-9 operating system. That means you can now get all the OS-9 programs from the magazine — programs that cannot be put on tape. Back issues of RAINBOW ON DISK are available beginning with October 1986. Subscriptions to RAINBOW ON DISK are \$99 a year in the U.S. Canadian rate is U.S. \$115. All other countries, U.S. \$130. Single copy rate is \$12 in the U.S.; U.S. \$14 in Canada; and U.S. \$16 in all other countries.*

To order by phone (credit card orders only), call (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries call (502) 228-4492.

Look for our envelope located between pages 66 and 67 for ordering individual subscriptions to THE RAINBOW, RAINBOW ON TAPE and RAINBOW ON DISK.

YES! Sign me up for a joint 1-year subscription (12 issues) to:

- ☐ THE RAINBOW and RAINBOW ON TAPE
☐ THE RAINBOW and RAINBOW ON DISK
☐ NEW ☐ RENEWAL (attach labels)

Name _____

Address _____

City _____ State _____ ZIP _____

Payment Enclosed ☐ (*payment must accompany order)

Charge: ☐ VISA ☐ MasterCard ☐ Am. Express
Account Number _____

Signature _____ Exp. _____

*U.S. currency only, please. In order to hold down costs, we do not bill. Kentucky residents add 5% sales tax. Please allow 6 to 8 weeks for delivery of first copies. Joint subscriptions to THE RAINBOW and RAINBOW ON TAPE or RAINBOW ON DISK begin with the current issue.

Please note: While group purchases of RAINBOW ON TAPE and RAINBOW ON DISK are permitted (and multiple subscriptions are even discounted, if purchased in one order from a club), no license to make copies is conveyed or implied. Yes, your group may even purchase a subscription to our disk/tape services, but such purchase in no way authorizes that any copies be made of that original disk/tape. Specifically, this means that the original disk/tape itself may indeed be kept in a club library for use by members. However, a group purchase does not entitle club members, individually or as a group, to copy that disk/tape.

Unauthorized copying of any copyright product is strictly illegal. The copyright (right to make copies) is in no way conveyed in the purchase transaction.



Pyramix

This is a fascinating CoCo 3 game of skill and coordination. Pyramix is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordon Tsvetkoff and a product of ColorVenture. Disk: \$19.95



The Freedom Series



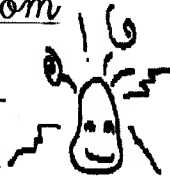
Vocal Freedom

Vocal Freedom turns your computer into a digital voice recorder. The optional Hacker's Pac lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the prerecorded message directly from its Random Access Memory with amazing fidelity! You may also SAVE or LOAD sounds to and from DISK. VF also tests memory

to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone. Will run on a CoCo 1, 2, or 3. Vocal Freedom Disk: \$34.95. Optional Hacker's Pac Disk: \$19.95. Disk for both: \$49.95

Mental Freedom

Would your friends be impressed if your computer could read their minds? Mental Freedom uses the techniques of Biofeedback to control video game action on the screen. Telekinesis? You control the action with your thoughts and emotions. Your goal is to materialize and levitate objects with the power of your mind while avoiding the insidious cobra. Mental Freedom teaches peace of mind in the face of adversity. Mental Freedom even talks in a perfectly natural voice without using a speech synthesizer! Requires Radio Shack's low cost Biofeedback monitor, Cat. #63-675. Will run on a CoCo 2 or 3 but not CoCo 1. Disk: \$24.95



Lightning Series

These three utilities give real power to your CoCo 3.

Ramdisk Lightning

This is the best Ramdisk available. It lets you have up to 4 mechanical disk drives and 2 Ram drives on-line and is fully compatible with our Printer Lightning. Disk: \$19.95

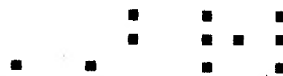
Printer Lightning

Load it and forget it--except for the versatility it gives you. Never wait for your printer again! Printer runs at high speed while you continue to work at the keyboard! Disk: \$19.95

Backup Lightning

Reads your master disk once and then makes super fast multiple disk backups on all your drives! No need to format blank disks first! Supports 35, 40 or 80 track drives. This utility requires 512K. Disk: \$19.95

COCO Braille



Produce standard grade 2 Braille on a Brother daisy wheel printer. Easy to use for sighted or blind user. No knowledge of Braille is necessary. Call for free sample. Will run on CoCo 1, 2, or 3. Disk: \$69.95

VDOS the Undisk

VDOS, The Undisk, ramdisk for the CoCo 1 or 2 only. Available only on tape: \$24.95
VDUMP, backup Undisk files to single tape file. Requires VDOS. Tape: \$14.95
VPRINT, Print Undisk directory. Requires VDOS. Tape: \$9.95

Add \$2.50 shipping/
handling in USA or
CANADA

Add \$5.00 to ship to
other countries

Dr. Preble's Programs
6540 Outer Loop
Louisville, KY 40228
24 Hour Hot Line
(502) 969-1818
Visa, MC, COD, Check

Advertisers Index

We encourage you to patronize our advertisers — all of whom support the Tandy Color Computer. We will appreciate your mentioning THE RAINBOW when you contact these firms.

21st Century Software	25	Hawsoft, Inc.	35	RAINBOW Bookshelf	8
Alpha Software Technologies	27	Howard Medical	3	RAINBOW CoCo History Book ..	82
Burke & Burke	51	Hypertech Software	93	RAINBOW On Tape and Disk	94
C.B. Games	53	JWT Enterprises	57	Robert Offerman	53
CoCo Pro	57	Metric Industries	85	Second City Software	97
Cocosoft	49	Microcom Software	7	Spectrosystems	93
Coless Computer Design	25	Microcom Software	9	SPORTSWARE	41
Colorware	19	Microcom Software	11	Sugar Software	79
Computer Island	63	Microcom Software	13	Sundog Systems	IFC
Computer Plus	IBC	Microcom Software	15	Supersoft, Inc.	45
Constellation Computer		Microcom Software	17	T & D Software	29
Consultants	35	Microdeal	BC	T & D Software	47
CRC/Disto	34	Microtech Consultants Inc.	37	T & D Software	61
Danosoft	31	Northern Technologies	47	T & D Software	77
Dayton Associates		Oblique Triad	33	Tandy/Radio Shack	33
of W.R. Hall, Inc.	75	Owl-Ware	69	Tandy/Radio Shack	42
Delphi	73	Owl-Ware	70	Tandy/Radio Shack	43
Dr. Preble's Programs	95	Owl-Ware	71	Tepco	83
Eversoft Games, Ltd.	55	P & M Products	63	True Data Products	65
Frank Hogg Laboratories	98	PCM	28	Wasatchware	55
Gimmesoft	21	Perry Computers	89	Zebra Systems	23
Granite Computer Systems	87	r3 Systems	49		
Gravity Studios	81	RAINBOW Binders	32		



☒ **Call:**
Belinda Kirby
Advertising Representative
(502) 228-4492



The Falsoft Building
9509 U.S. Highway 42
P.O. Box 385
Prospect, KY 40059
FAX (502) 228-5121



☐ **Call:**
Kim Vincent
Advertising Representative
(502) 228-4492

UltiMusE III

The Ultimate Music Editor for the CoCo 3

"What if...

all CoCo music programs were this good?"

UltiMusE III is a MIDI 'Notation Sequencer'. It lets you write and edit sheet music on a 640x192 graphics screen using the mouse, play it on ANY MIDI-equipped synthesizer(s), and print out the score... Written by an experienced computer professional who is also a serious amateur musician and composer. With UltiMusE III, there is no more 'faking' to play what you want to hear! Perfect for the trained musician, UltiMusE III's natural notation also helps a beginner to copy a favorite piece of sheet music just as it looks. Why should your music sound like a machine? UltiMusE III has a wide pitch range, from 4 octaves below Middle C to over 3 above. Each staff has a 4-octave range centered on one of four clefs - Treble, Guitar, Bass, and Double Bass. Staff placement, clefs, and part and MIDI channel assignments can ALL be edited... Professional software should use a professional Operating System. UltiMusE III uses the advanced features of OS-9 Level II and does not interfere with its windowing and multitasking in any way.

SYSTEM REQUIREMENTS: CoCo 3 with at least 256K memory, OS-9 Level 2, Mouse or Joystick (Hi-Res Joystick Adapter recommended), Synthesizer(s) with MIDI-In jack, plus a Serial to MIDI cable. Tandy's DMP printer, a MIDI Interface Pak, and a Multi-Pak are optional equipment.

UltiMusE III
\$54.95

**NOW
FEATURING**
**A 32K VIRTUAL
MEMORY MUSIC
SCORE BUFFER**

CASIO MT-240 MIDI KEYBOARD... \$149.95
A/C POWER ADAPTER..... \$14.95
SERIAL TO MIDI CABLE..... \$19.95

Newspaper *Plus*

FINAL EDITION

DeskTop Publishing for the CoCo 3 just got better! With the ALL NEW NEWSPAPER PLUS - FINAL EDITION, you can create complete and sophisticated Banners, Headlines along with Text Columns and Graphics. Bring in different pictures, fonts, fill patterns, and text from disk and create a publication with that pro-look to it. Comes complete with 22 fonts, 50 NewsArt pictures and fill patterns. 128k or 512k Disk

STILL ONLY \$48.95

'FINAL EDITION' is just a news print slogan meaning the very latest published issue. In the case of Newspaper Plus - Final Edition, it means the latest upgrade is NOW available. Here are some of the added features being offered;

- * Text import with Left, Right, Centered & Justification
- * RamDisk Utility (512k)
- * Stretch, Shrink & Compress picture utility
- * A new 'Design Your Own' layout feature
- * Full Font import ability
- * Text to Picture wrap-around
- * Disk Transfer Utility (512k)

APBBS Ver: 3.00.00

QUESTION: Have you ever wondered how someone can sell and support two different BBS programs while claiming both to be the BEST? Good question you ask...we think so too!!! With the exclusive SCS commercial release of Mike Guzzi's APBBS program we end a years quest for a POWERFUL, HIGH QUALITY, and AFFORDABLE BBS program. Besides these three requirements, we also demanded full author assistance to help answer your questions and lend technical support. Mike Guzzi has not only written such a program in APBBS but has also offered his expertise and knowledge as the programmer and a SYSOP. Giving you FULL SUPPORT AFTER THE SALE! APBBS requires a CoCo3 w/512k memory, at least two double sided floppy drives (a hard drive is strongly recommended), OS-9 Level2, and RS-232 pak. APBBS is not for everyone. It is designed and intended for the SYSOP who demands performance and support.

SPECIAL INTRODUCTORY PRICE OF \$39.95

WORD SEARCH:	\$22.95
A Word Search Puzzle Generator Utility program. CoCo 1,2,&3 Disk	
MORSE CW:	\$19.95
A complete Morse Code Tutorial program. CoCo 1,2,&3 Disk	
SPACE RAIDERS:	\$16.95
A FAST ACTION ARCADE GAME. Test your skills! CoCo 1,2,&3 Disk	
STARPIC UTILITY:	\$19.95
DMP-PIC UTILITY:	\$19.95
GEM-PIC UTILITY:	\$19.95
A complete Graphics Printing Utility program for the Star NX-1000 or Tandy's DMP or the Gemini Dot Matrix printers. Works in an easy to use Point 'N Click pull down menu environment. A MUST HAVE printing utility. CoCo 1,2,&3 Disk	
Check09MV: #2.1	\$25.95
Check09MV interacts with MultiVue for FAST & EASY checkbook balancing. No more waiting for your bank statement for an ending balance. Check09MV will produce a check-by-check running total of your account in an easy to use format. End those monthly surprises! 512k	
MASTER CATALOG:	\$19.95
MASTER CATALOG 3:	\$19.95
Organize your floppy disks with Master Catalog. Supports single & double sided drives, alphabetize, sort, and search & find up to 3,000 filenames. Program supports a Column Format Hard Copy and is 100% ML for lightning response. When ordering, please specify CoCo 1,2, or 3 version.	
START OS-9	\$32.95
An Enjoyable, Hands-On Guide To OS-9 Level 2 On The Color Computer 3. Work from a step-by-step easy to follow tutorial book and program disk. Requires 2 drives, 512k and an 80-column monitor. START OS-9...NOW NO MORE EXCUSES.	
Basic Screen Editor	\$19.95
A-DOS3	\$34.95
MY-DOS	\$14.95
EPROM BURN SERVICE	\$15.00
Ram Disk Lightning	\$16.95
Printer Lightning	\$16.95
BackUp lightning	\$16.95
VIP Library	\$149.95
VIP Writer III	\$79.95
VIP Calc III	\$69.95
VIP DataBase III	\$69.95
OS-9 Solution	\$24.95
Schematic Drafting Processor	\$24.95
Tape to Disk / Disk to Tape	\$19.95
Multi-Pak Crack	\$24.95
TelePatch	\$24.95
BlackJack Royale	\$16.95
CoCo Calender Deluxe	\$19.95
NewsArt A thru Z	
26 disks filled with useable clip art for Newspaper Plus & Newspaper Plus - Final Edition. \$100.00 for the complete set.	

**MASTER CARD - VISA
C.O.D. - MONEY ORDERS**

**ADD \$2.50 SHIPPING
(\$4.50 FOREIGN) AND
AN ADDITIONAL \$2.50
FOR C.O.D. ORDERS**

Allow 1 to 3 weeks delivery

**P.O. BOX 72956
ROSELLE, IL
60172**

**ORDER
708-653-5610
BBS
312-745-1387**

SECOND CITY SOFTWARE

Tomcat™

The Tomcat is a major improvement over the CoCo 3. The Tomcat's TC9 6809 CPU is over 25% faster! It uses a PC AT compatible keyboard, has two 'real' serial ports, supports a serial mouse, has a parallel printer port, has provision for 512K on board RAM or it can use a CoCo 3 512K memory upgrade, can be upgraded to 1 megabyte with the Disto 1 Meg upgrade with no soldering, it has 8 bit D to A and 8 bit A to D. 8 bit provides better sound and a higher resolution joystick, 256 verses 64, it supports an internal speaker, has the standard CoCo bus so that CoCo cartridges can be used (Disto, Eliminator, Burke&Burke Etc.), is powered by a PC style power supply. This also allows installing the board in most PC clone cases, will work with most, if not all OS9 software, will have RSDOS compatibility, and is K-Bus compatible! Whew!!!

K-Bus capability allows interfacing the Tomcat to the 68000 and even the 68030! By installing a 68000 CPU, the Tomcat becomes a dual-processing system! When in OS9 Level II mode the 68000 becomes a co-processor to the Tomcat, like a accelerator to Level II with a 2 or 3 fold improvement in performance!

When the 68000 is the master under OS9/68K, the TC9 acts as a co-processor to 68K. Switching back and forth between systems will be easy and will allow a smooth transition from OS9 to OSK. It is not necessary to have OSK to get the benefits of the 68000, but it provides a smooth transition when and if you decide to make the move. You go at your own pace, upgrading as you desire, and at each point you get a significant improvement in performance, for a very slight cost.

Expansion

The world of 68K is open to you. The logical first step is to add a 68000 CPU which will immediately speed up Level II operations by several factors and opens the door to running OSK. No other additions are needed to run OSK, as OSK will run in the TC9 memory and use TC9 I/O. For further performance increases additional boards, memory, I/O etc. can be added to the Tomcat. It is even possible to have several TC9's in the Tomcat for a multi-processing system! Memory limits are 16 Megabytes of which more than 14 Megabytes can be RAM! Because of the bus concept upgrades to future CPUs only requires adding that CPU to accomplish it. For example, you could start with a 68000 and later replace that with a 68030 and still use ALL of your other cards. When new cards such as the 68040 become available, you could add those too.



This is upgrading without having to throw anything away. Even if you eventually switched over to 68K completely the TC9 still functions as a multi-function graphics co-processor. Because of the wide variety of K-Bus boards available and those under development, the possibilities for the future are unlimited. The TC9 Tomcat truly is the CoCo 4 that Tandy should have made, for that matter it could well be the CoCo 5, 6, 7, 8.....

Should you get one?

If you currently own a CoCo 3 and use it for either RSDOS or OS9 Level II the TC9 Tomcat is your road to the future. It will run your current software faster and give you powerful new features and performance at modest cost. You get the ability to expand at your own pace, at low cost, the way you want to do it, for your future.

The future.

FHL, in business since 1976, has been manufacturing 680x0 based computers for over 6 years! The Tomcat is the computer for the 90's. We have put all of our knowledge and experience into the creation of the Tomcat. We believe it is the best choice for you and for us. We create computers because we like to use them, not because we like to sell them. Every computer we've made has been one we've wanted for ourselves. The Tomcat is the best we've done... so far.

I Want One!

We will start deliveries in late June of 1990. You can reserve a place on the waiting list by simply calling or sending in your request. No deposit is required, you will be contacted before delivery to confirm your order. There is no obligation.

For a system with case, power/supply, TC9 and keyboard, prices start at only \$499.95. The TC9 board alone is only \$299.95. Many other options and configurations are available. Please call or write for a complete brochure.

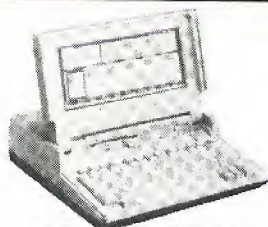


Tomcat™ by...

USER-FRIENDLY
SERVICE SINCE 1976!

Frank Hogg
LABORATORY
INC.

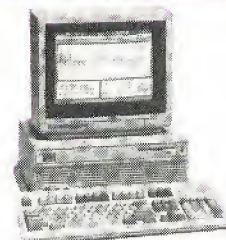
From Computer Plus to YOU ...
PLUS after **PLUS** after **PLUS**



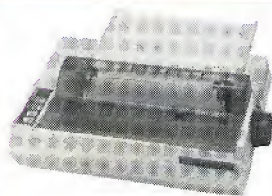
Tandy 1400 FD \$899*
 Tandy 102 32K \$349*
 Tandy WP-2 \$279



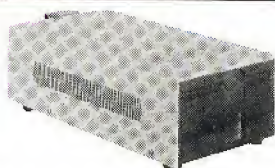
Color Computer 3
 w/128K Ext. Basic \$115*



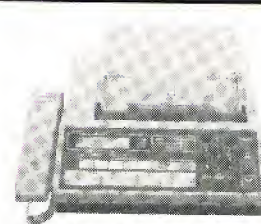
Tandy 1000 SL/2 \$749
 Tandy 1000 TL/2 \$929



DMP-133 \$199*



Color Computer Disk Drive
 Drive 0 \$179* Drive 1 \$149



TandyFax \$699*

BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

COMPUTERS

Tandy 1000 HX 1 Drive 256K	259.00*
Tandy 2500 XL 1 Drive 1 Meg	1119.00
Tandy 3000 NL 1 Drive 512K	869.00*
Tandy 2800 HD 1 Drive 1 Meg	2529.00
Tandy 1100 FD 1 Drive 640K	779.00

PRINTERS

Radio Shack DMP-107 120 CPS	219.00
Radio Shack DMP-442 300 CPS	539.00
Radio Shack DMP-133 160 CPS	199.00*
Radio Shack DWP-230 Daisy Wheel	179.00*
Tandy LP-1000 Laser Printer	1899.00
Tandy DMP-240 192 CPS 8 color	399.00
Star Micronics NX-1000 Rainbow	269.00
Panasonic KXP 1180 192 CPS	219.00*
Panasonic KXP 1191 240 CPS	259.00*
Panasonic KXP 1124 192 CPS	329.00*
Okidata 320 300 CPS	369.00
Okidata 390 270 CPS 24 Wire HD	515.00
OKI Laser 400 4PPM	999.00

MODEMS

Radio Shack DCM-6	52.00
Radio Shack DCM-7	85.00
Practical Peripheral 1200 Baud	149.00
Practical Peripheral 2400 Baud	179.00

COLOR COMPUTER MISC.

Radio Shack Drive Controller	79.00*
Extended Basic Rom Kit(28 pin)	14.95
64K Ram Upgrade Kit(2 or 8 chip)	39.00
Radio Shack Deluxe Keyboard Kit	24.95
HI-RES Joystick Interface	8.95
Color Computer Deluxe Mouse	44.00
Multi Pak Pal Chip for COCO 3	14.95
COCO 3 Service Manual	29.95
Serial to Parallel Converter	59.95
Radio Shack Deluxe Joystick	13.95*
Magnavox 8515 RGB Monitor	299.00
Magnavox Green or Amber Monitor	99.00
Radio Shack CM-8 RGB Monitor	179.00*
Radio Shack VM-4 Green Monitor	99.00
PBJ OK COCO 3 Upgrade Board	24.95
PBJ 512K COCO 3 Upgrade	139.00
Tandy OK COCO 3 Upgrade Board	29.95
Tandy 512K COCO 3 Upgrade	149.00

COLOR COMPUTER SOFTWARE

	TAPE	DISK
The Wild West(COCO3)		25.95
Worlds Of Flight	34.95	34.95
Mustang P-51 Flight Simul.	34.95	34.95
Flight 16 Flight Simul.	34.95	34.95

COCO Util II by Mark Data	39.95
COCO Max III by Colorware	79.95
Max 10 by Colorware	79.95
AutoTerm by PXE Computing	29.95 39.95
TW-80 by Spectrum (COCO3)	39.95
TeleWriter 64	49.95 59.95
TeleWriter 128	79.95
Elite Word 80	79.95
Elite Calc 3.0	69.95
CoCo 3 512K Super Ram Disk	19.95
Home Publishing by Tandy (CoCo3)	35.95
Sub Battle Sim. by Epyx (CoCo3)	26.95
Thexder by Sierra (CoCo3)	22.45
Kings Quest III by Sierra (CoCo3)	31.45
Flight Sim.II by SubLogic (CoCo3)	31.45
OS-9 Level II by Tandy	71.95
OS-9 Development System	89.95
Multi-View by Tandy	44.95
VIP Writer (disk only)	69.95
VIP Integrated Library (disk)	149.95

Prices are subject to change without notice.
 Please call for shipping charges. Prices in our re-
 tail store may be higher. Send for complete
 catalog

*Sale prices through 6/30/90

CALL TOLL FREE
1-800-343-8124

- LOWEST POSSIBLE PRICES
- BEST POSSIBLE WARRANTY
- KNOWLEDGEABLE SALES STAFF
- TIMELY DELIVERY
- SHOPPING CONVENIENCE



**computer
 plus**

P.O. Box 1094
 480 King Street
 Littleton, MA 01460

SINCE 1973

IN MASSACHUSETTS CALL (508) 486-3193

Slots & Cards

VGA Graphics Depicted



microdeal

576 S. Telegraph
Pontiac, MI 48053
(313) 334-5700

Did you ever dream of visiting VEGAS, but you weren't sure what to expect — or if you would be able to afford it? Well, now you can play your favorite slot machine, or sit down at the blackjack table without even leaving the comfort of your home. Browse through different style slot machines (many different Multiplier slots). Visit the change booth if - or is that when? - you run out of cash, without feeling a pain in your wallet. Walk around the corner and sit down at any of a number of different style card games. Enjoy video five card draw poker - where it takes jacks or better to win. Or play Blackjack against the ever treacherous house dealer. Play Hi-Low and wager the max every chance you get. Do you like Keno? If so, choose your numbers, then sit back and wait to see if they are drawn!

All versions display vivid true to VEGAS graphics. Whatever your game, Slots & Cards has it for you! Slots & Cards is available for the IBM PC & Compatibles, Commodore Amiga, Atari ST and the CoCo III.

See your local dealer for orders and information or call us directly